NEXCOM International Co., Ltd.

Mobile Computing Solutions

Vehicle Telematics Computer

VTC 71-D Series

User Manual

NEXCOM International Co., Ltd.
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Preface

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Acknowledgements

VTC 7100-D1K, VTC 7110-D1K and VTC 7120-D1K are trademarks of NEXCOM International Co., Ltd. All other product names mentioned herein are registered trademarks of their respective owners.

Regulatory Compliance Statements

This section provides the FCC compliance statement for Class B devices and describes how to keep the system CE compliant.

Declaration of Conformity

FCC

This equipment has been tested and verified to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area (domestic environment) is likely to cause harmful interference, in which case the user will be required to correct the interference (take adequate measures) at their own expense.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

e13 Mark

The "e" mark is the proof of compliance with directives (laws) required by the European Union. The Council of European communities in Brussels issues these directives and all members must accept approved products.
e13 - Luxembourg
For more information, visit http://www.tuv.com/jp/en/_e_mark_and_e_mark_homologation_for_vehicles_vehicle_components_.html.

RoHS Compliance

NEXCOM RoHS Environmental Policy and Status Update

NEXCOM is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2002/95/EU, to be your trusted green partner and to protect our environment.
RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominated diphenyl Ethers (PBDE) < 0.1% or 1,000ppm.
In order to meet the RoHS compliant directives, NEXCOM has established an engineering and manufacturing task force in to implement the introduction of green products. The task force will ensure that we follow the standard NEXCOM development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which NEXCOM are renowned.

How to recognize NEXCOM RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix "(LF)" will be added to the compliant product name.
All new product models launched after January 2006 will be RoHS compliant. They will use the usual NEXCOM naming convention.

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Warranty and RMA

NEXCOM Warranty Period

NEXCOM manufactures products that are new or equivalent to new in accordance with industry standard. NEXCOM warrants that products will be free from defect in material and workmanship for 2 years, beginning on the date of invoice by NEXCOM. HCP series products (Blade Server) which are manufactured by NEXCOM are covered by a three year warranty period.

NEXCOM Return Merchandise Authorization (RMA)

- Customers shall enclose the "NEXCOM RMA Service Form" with the returned packages.
- Customers must collect all the information about the problems encountered and note anything abnormal or, print out any on-screen messages, and describe the problems on the "NEXCOM RMA Service Form" for the RMA number apply process.
- Customers can send back the faulty products with or without accessories (manuals, cable, etc.) and any components from the card, such as CPU and RAM. If the components were suspected as part of the problems, please note clearly which components are included. Otherwise, NEXCOM is not responsible for the devices/parts.
- Customers are responsible for the safe packaging of defective products, making sure it is durable enough to be resistant against further damage and deterioration during transportation. In case of damages occurred during transportation, the repair is treated as "Out of Warranty."
- Any products returned by NEXCOM to other locations besides the customers' site will bear an extra charge and will be billed to the customer.

Repair Service Charges for Out-of-Warranty Products

NEXCOM will charge for out-of-warranty products in two categories, one is basic diagnostic fee and another is component (product) fee.

System Level

- Component fee: NEXCOM will only charge for main components such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistor, capacitor.
- Items will be replaced with NEXCOM products if the original one cannot be repaired. Ex: motherboard, power supply, etc.
- Replace with 3rd party products if needed.
- If RMA goods can not be repaired, NEXCOM will return it to the customer without any charge.

Board Level

- Component fee: NEXCOM will only charge for main components, such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistors, capacitors.
- If RMA goods can not be repaired, NEXCOM will return it to the customer without any charge.

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Warnings

Read and adhere to all warnings, cautions, and notices in this guide and the documentation supplied with the chassis, power supply, and accessory modules. If the instructions for the chassis and power supply are inconsistent with these instructions or the instructions for accessory modules, contact the supplier to find out how you can ensure that your computer meets safety and regulatory requirements.

Cautions

Electrostatic discharge (ESD) can damage system components. Do the described procedures only at an ESD workstation. If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

Safety Information

Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Follow all warnings and cautions in this manual.
- When replacing parts, ensure that your service technician uses parts specified by the manufacturer.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- The load of the system unit does not solely rely for support from the rackmounts located on the sides. Firm support from the bottom is highly necessary in order to provide balance stability.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Installation Recommendations

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:

- A Philips screwdriver
- A flat-tipped screwdriver
- A grounding strap
- An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needlenose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.

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Safety Precautions

- Read these safety instructions carefully.
- Keep this User Manual for later reference.
- Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
- Keep this equipment away from humidity.
- Put this equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.
- Do not leave this equipment in either an unconditioned environment or in a above 40°C storage temperature as this may damage the equipment.
- The openings on the enclosure are for air convection to protect the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Place the power cord in a way so that people will not step on it. Do not place anything on top of the power cord. Use a power cord that has been approved for use with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.
- All cautions and warnings on the equipment should be noted.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
- Never pour any liquid into an opening. This may cause fire or electrical shock.
- Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- If one of the following situations arises, get the equipment checked by service personnel:
  a. The power cord or plug is damaged.
  b. Liquid has penetrated into the equipment.
  c. The equipment has been exposed to moisture.
  d. The equipment does not work well, or you cannot get it to work according to the user's manual.
  e. The equipment has been dropped and damaged.
  f. The equipment has obvious signs of breakage.
- Do not place heavy objects on the equipment.
- The unit uses a three-wire ground cable which is equipped with a third pin to ground the unit and prevent electric shock. Do not defeat the purpose of this pin. If your outlet does not support this kind of plug, contact your electrician to replace your obsolete outlet.
- CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
- The computer is provided with CD drives that comply with the appropriate safety standards including IEC 60825.

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Technical Support and Assistance

1. For the most updated information of NEXCOM products, visit NEXCOM's website at www.nexcom.com.

2. For technical issues that require contacting our technical support team or sales representative, please have the following information ready before calling:
   - Product name and serial number
   - Detailed information of the peripheral devices
   - Detailed information of the installed software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wordings of the error messages

Warning!

1. Handling the unit: carry the unit with both hands and handle it with care.

2. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

3. CompactFlash: Turn off the unit's power before inserting or removing a CompactFlash storage card.

Conventions Used in this Manual

Warning:
Information about certain situations, which if not observed, can cause personal injury. This will prevent injury to yourself when performing a task.

Caution:
Information to avoid damaging components or losing data.

Note:
Provides additional information to complete a task easily.

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Package Contents

Before continuing, verify that the VTC 71xx-DX series package that you received is complete. Your VTC 71xx-DX series package should have all the items listed in the following table.

Item	P/N	Name	Specification	Qty
1	4NCPM00302X00	(T)Terminal Blocks 3P Phoenix Contact:1777992	5.08mm Male DIP Green	1
2	50311F0110X00	(H)Flat Head Screw Long FEI:F3x5ISO+NYLOK NIGP	F3x5 NI NYLOK	4
3	60233PW134X00	Power Cable for VTK33B SMBus Signal EDI:356206060201-RS	ATX Power Con. 6P TO 6P PITCH:4.2mm L:200mm	1
4	60233SAM05X00	GPS Antenna ARKNAV:A-130 GPS Antenna 5M SMA180P R1 L3	FOR VTC 5M/SMA180P	1
5	602DCD0527X00	Driver CD		1
6	4NCPF00513X00	(N)Terminal Blocks 5P ANYTEK:TJ0531520000G	3.81mm Female DIP Green	1
7	4NCPF01006X00	(N)Terminal Blocks 10P ANYTEK:TJ1031520000G	3.81mm Female DIP Green	2

Note: Item 6 and 7 are only for VTC 7100-D1K, VTC 7110-D1K and VTC 7120-D1K.

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Ordering Information

The following provides ordering information for VTC 71xx-Dx series.

- **VTC 7100-D1K (P/N: 10V00710004X0)**
  Intel® Atom™ D2550 1.86GHz, 2GB DDR3 SODIMM, LVDS/ VGA Output, 1 RS-232, 1 RS-422/485 with isolation DI/DO, COM and 1x OBDII module (SAE J1939 or J1708)
- **VTC 7110-D1K (P/N: 10V00711007X0)**
  Intel® Core™ i7 1.5GHz, 2GB DDR3 SODIMM, LVDS/ VGA Output, 1 RS-232, 1 RS-422/485 with isolation DI/DO, COM and 1x OBDII module (SAE J1939 or J1708)
- **VTC 7120-D1K (P/N: 10V00712002X0)**
  Intel® Celeron® 847E 1.1GHz, 2GB DDR3 SODIMM, LVDS/ VGA Output, 1 RS-232, 1 RS-422/485 with isolation DI/DO, COM and 1x OBDII module (SAE J1939 or J1708)

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Chapter 1: Product Introduction

Overview

VTC 7100-D1K

Front View

Rear View

VTC 7110-D1K & VTC 7120-D1K

Front View

Rear View

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VTC 71xx-DX series, adopting the Intel® high performance processor, is a new generation of VTC series. In addition to keeping the advantage of existing VTC series, it offers dual LAN ports for redundancy, two high speed interface for storage, 2.5" SATA and CFast. The storage is easily accessible from the front side for maintenance concern. Furthermore, it offers OBDII module (SAE J1939/J1708) for heavy duty truck. What's remarkable is its flexible designs that can reserve the space and interface to extend the required features for application such as 4-channel POE with second storage interface.

VTC 71xx-DX series fulfills vehicle industry requirements. The design itself is compliant with vehicle industrial standard such as eMark. More features required for in-vehicle operations, such as power ignition delay control, low-power protection and SMBus connection, etc., are continued from NEXCOM's other in-vehicle computer products. The GPS function navigates drivers to ultimate fleet management. Optional 802.11b/g/n, 3.5G, GPRS, and Bluetooth availability make VTC 71xx-DX series ready for wider coverage and future trend. Multiple display connections make VTC 71xx-DX series an ideal choice for in-vehicle signage platforms as well.

Key Features

- Built-in Intel® processor
- Support two Ethernet LAN ports
- Removal 2.5" SSD tray
- OBDII module supporting SAE J1939 or J1708
- Optional isolation digital input and output
- 9~36V wide range DC power input
- Smarter ignition power on/off, delay-time and low voltage protection
- Rugged fanless design to meet MIL standard
- Voice communication and SMS wake up function with CM8000 WWAN module

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Hardware Specifications

VTC 7100-D1K/ 7110-D1K/ 7120-D1K

CPU

- VTC7100 series: Intel® Atom™ D2550 1.86GHz
- VTC7110 series: Intel® Core™ i7 2610UE 1.5GHz
- VTC7120 series: Intel® Celeron® 847E 1.1GHz

Main Chipset

- VTC7100 series: ICH10R
- VTC7110 series: QM67
- VTC7120 series: QM67

Memory

- VTC 7110 and VTC 7120 series: One 204-pin SO-DIMM DDR3 1333 up to 8GB
  2GB (default)
- VTC 7100 series: One 204-pin SO-DIMM DDR3 1066 up to 4GB
  2GB (default)

Expansion

- 1x Mini-PCIe socket (PCIe + USB) for WLAN option
- 1x Mini-PCIe socket (USB) for WWAN option
- 1x Bluetooth module for option
- 1x onboard uBlox NEO-6Q GPS module or optional GPS module with dead reckoning

I/O Interface-Front

- 1x Line-out, 1x Mic-in (for WWAN CM8000 voice communication)
- 2x SIM card socket (selectable)
- 1x System reset button
- 1x USB 2.0 host type A connector
- 1x Power button
- 1x CFast with protection cover
- 1x Accessible 2.5" SATA II SSD tray
- 4x LED's for power, storage, WLAN/ WWAN and GPIO

I/O Interface-Rear

- 1x 9~36VDC input with Ignition
- 1x 12V/4A DC output, SMBus
- 1x DB26 LVDS interface with 12V and USB2.0
- 1x DB15 VGA
- 1x DB9 RS-232 (default) or OBDII (optional)
- 1x DB9 RS-422/ 485
- 1x DB9 female connector for 4x DI and 4x DO
  (Digital Input)
  Input Voltage (Internal Type): 5VDC TTL (default)
  Input Voltage (Source Type): 0~30 VDC
  (Digital Output)
  Digital Output (Sink Type): 5VDC TTL (default), max current: 20mA
  Digital Output (Source Type): 0~30VDC, max current: 250mA
- 2x USB 2.0 host type A connector
- 2x RJ45 with LEDs for 10/ 100/ 1000Mbps Ethernet
- 10-Pin terminal block for 8x DI and 8x DO
  Isolation: 5K Vrms
  (Isoated Digital Input)
  Input Voltage (Internal Type): 5VDC TTL (default)
  Input Voltage (Source Type): 0~30 VDC
  (Isoated Digital Output)
  Digital Output (Sink Type): 5VDCTTL (default), max current: 20mA
  Digital Output (Source Type): 0~30VDC, max current: 250mA
- 5-Pin terminal block for 3x analog input
  Isolation: 2K Vrms
  2x isolated analog voltage input 12VDC (Max.)
  1x isolated analog current input 10A (Max.)
- 1x Line-out, 1x Mic-in
- 1x SMA-type GPS antenna connector
- 4x Antenna hole reserved for SMA-type antenna connector (WWAN/ WLAN/ BT)
- 1x DB9 male connector for 1x OBDII module (default) and 2x OBDII module (optional)

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Others

- 1x PCI-104
- 1x G Sensor

Note: If PCI-104 card & 2.5" SSD installation are required, 2.5" SSD will be internal type and front panel will be changed.

Power Management

- Selectable boot-up & shut-down voltage for low power protection by software
- Setting 8-level on/off delay time by software
- Status of ignition and low voltage status can be detected by software
- Support S3/ S4 suspend mode

Dimensions

- VTC 7100-D1K: 260mm (W) x 176mm (D) x 73.6mm (H) (10.24"x 6.93"x 2.9") 4 Kg (7.47 Lb)
- VTC 7110-D1K: 260mm (W) x 176mm (D) x 90.1mm (H) (10.24"x 6.93"x 3.51") 3.89 Kg (8.57 Lb)
- VTC 7120-D1K: 260mm (W) x 176mm (D) x 90.1mm (H) (10.24"x 6.93"x 3.51") 3.89 Kg (8.57 Lb)

Construction

- Aluminum enclosure with fanless design

Environment

- Operating temperatures:
  Ambient with air: -30°C to 50°C (VTC 7110 / 7120 series)
  Ambient with air: -30°C to 55°C (VTC 7100 series)
- Storage temperatures: -35°C to 85°C
- Relative humidity: 10% to 90% (non-condensing)
- Vibration (random): 1g@5~500 Hz (in operation, SSD)
- Vibration (SSD):
  Operating: MIL-STD-810G, Method 514.6, Category 4, common carrier US highway truck vibration exposure
  Storage: MIL-STD-810G, Method 514.6, Category 24, minimum integrity test
- Shock (SSD):
  Operating: MIL-STD-810G, Method 516.6, Procedure I, functional shock=20g
  Non-Operating: MIL-STD-810G, Method 516.6, Procedure V, crash hazard shock test=75g

Certifications

- CE approval
- FCC Class A
- e13 Mark

Power Management

- Power-on delay time is selectable by BIOS to disable and enable in 10sec / 30sec / 1min / 5min / 10 min / 15min / 30min / 1hr.
- Power-off delay time is selectable by BIOS to disable and enable in 20sec / 1min / 5min / 10min / 30min / 1hr / 6hr / 18hr.
- S3, S4 suspend mode
- Ignition On/Off status detectable by SW
- Low battery status detectable by SW
- Ignition enable/disable is jumper selectable
- Shut down system automatically when the system's internal temperature is over 80C.
- VTC 71 series will automatically shut down 5 minutes after the duration of low battery voltage is over 60 sec. User can detect this situation via software.
- If the ignition is off and the system is still on after 3 minutes, VTC 71 series will shut down automatically.
- If the ignition is off, the user can detect this status via the software.
- If the ignition is turned on again and the power-off delay is in progress, VTC 71 series will cancel the delay function and will continue to operate normally.
- If the ignition is turned on again and the power-off delay ended, VTC 71 series will shut down completely will power-on again automatically.
- If the ignition is turned off again and power-on delay is in progress, VTC 71 series will cancel the delay and stay in power-off status.
- If the ignition is turned off again and the power-on delay ended (entered OS already), VTC 71 series will continue to operate normally.
- If the ignition is turned off again and the power-on delay ended (in BIOS process), VTC 71 series will shut down immediately.
- If VTC 71 series is off, only below 10mA is used.

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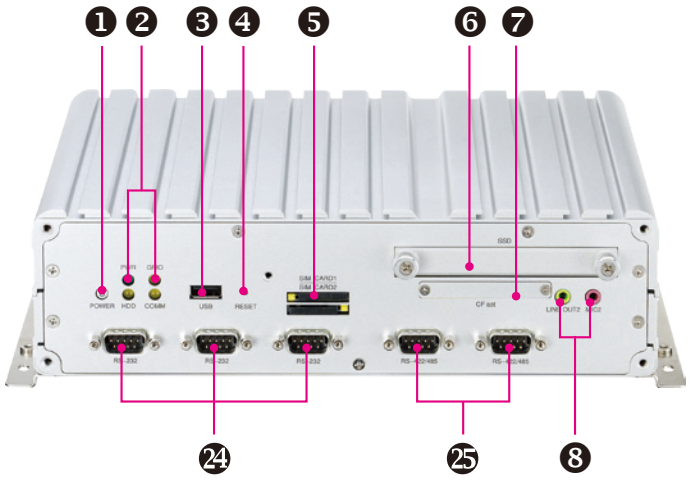
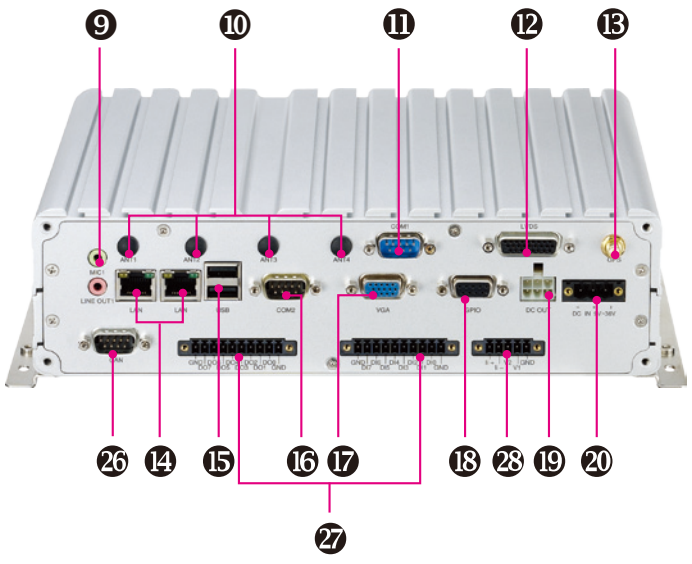
Connector Numbering

The following diagrams indicate the numbers of the connectors. Use these numbers to locate the connectors' respective pinout assignments on chapter 2 of the manual. Please note that connector numbers 6, 10, and 13 pinouts are not available.

VTC 7100-D1K





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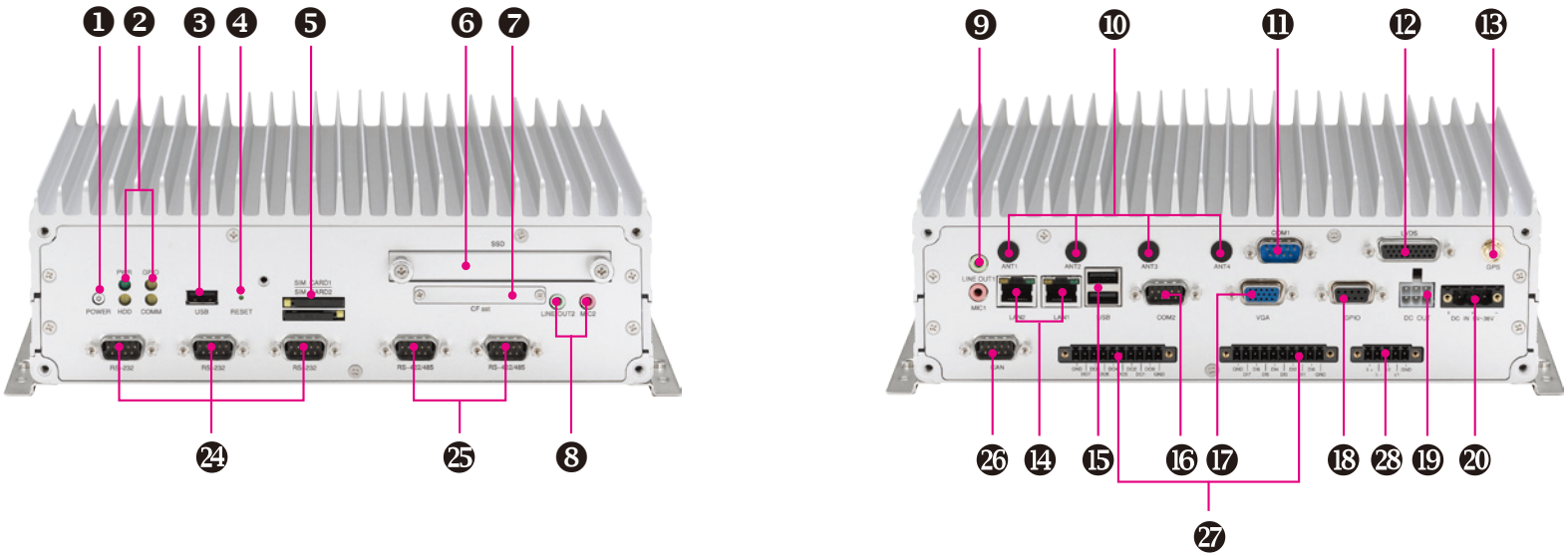
VTC 7110-D1K & VTC 7120-D1K



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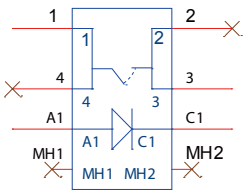
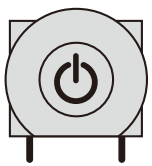
Chapter 2: External Connectors Pinout Description

Power Button

Connector Number: 1





Pin	Definition	Pin	Definition
1	GND	2	NC
3	+V3.3ALW	4	NC
A1	VCC5_S	C1	GND

Power On & SSD or HD Active LED

Connector Number: 2

Pin	Function Description
T1	POWER LED
B1	HD LED

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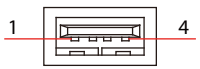
WLAN & WWAN Active LED

Connector Number: 2

Pin	Function Description
T1	WWAN LED
B1	WLAN LED

USB 2.0 Port

Connector Number: 3



Pin	Definition	Pin	Definition
1	VCC	2	DATA1-
3	DATA1+	4	GND

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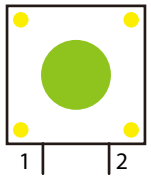
Reset Button

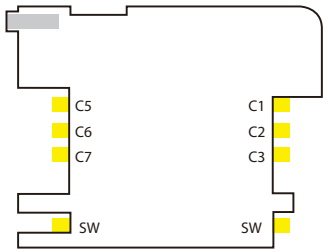
Connector Number: 4



Pin	Function Description
1	GND
2	RST_BTN#

SIM Card Connector-3.5G Wakeup

Connector Number: 5



Pin	Definition	Pin	Definition
C1	POWER VOLTAGE	C2	RESET SIGNAL
C3	CLOCK SIGNAL	C5	GND
vedC6	VPP:PROGRAM VOLTAGE	C7	I/O
SW	Contact present switch		

NOTE: Only SIM CARD 1 (top side) can support SMS wake up function with CM8000 WWAN module.

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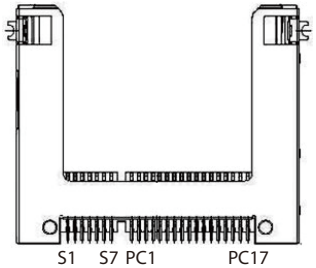
CFast Card Connector

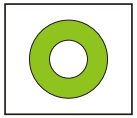
Connector Number: 7



Pin	Definition	Pin	Definition
S1	GND	S2	SATA_TXP
S3	SATA_TXN	S4	GND
S5	SATA_RXN	S6	SATA_RXP
S7	GND		
PC1	CFAST_CDI	PC2	GND
PC3	NC	PC4	NC
PC5	NC	PC6	NC
PC7	GND	PC8	CFAST_LED1
PC9	CFAST_LED2	PC10	NC
PC11	NC	PC12	NC
PC13	VCC3	PC14	VCC3
PC15	GND	PC16	GND
PC17	CFAST_CDO		

Line-out

Connector Number: 8



Pin	Definition	Pin	Definition
1	FRONT_OUT_RC	2	FRONT_JD
3	NC	4	FRONT_OUT_LC
5	GND	6	GND

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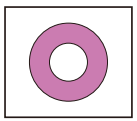
Mic-in

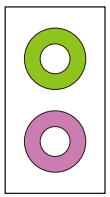
Connector Number: 8



Pin	Definition	Pin	Definition
1	NC	2	MIC_JD
3	NC	4	MIC_OUT-L
5	GND	6	GND

Mic-in2, Line-out2

Connector Number: 9



Pin	Definition	Pin	Definition
1	LINE_OUT_L	2	SURR_JD
3	NC	4	LINE_OUT_R
5	GND	6	GND
22	GND	23	NC
24	MIC_JD	25	MIC_OUT

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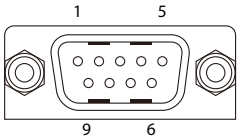
RS232 Connector

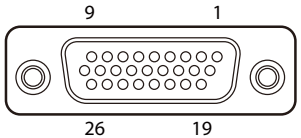
Connector size: DB9, Male
Connector Number: 11



Pin	Definition	Pin	Definition
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

LVDS Connector

Connector size: DB26, Female
Connector Number: 12



Pin	Definition	Pin	Definition
1	Panel_ EN	2	Panel_control
3	VDD	4	VDD
5	LCDD09(OUT3)	6	LCDD01(OUT0)
7	LCDD08(OUT3#)	8	LCDD00(OUT0#)
9	LCDD_GND	10	LCDD_GND
11	LCDD07(CLK)	12	LCDD03(OUT1)
13	LCDD06(CLK#)	14	LCDD02(OUT1#)
15	LVDS_GND	16	LCDD_GND
17	LCDD05(OUT2)	18	Power on push button
19	LCDD04(OUT2#)	20	Panel_backlight
21	LCDD_GND	22	Panel-Gnd
23	USB_0#	24	Contact_DET#
25	USB_0	26	USB_VCC

NOTE: maximum resolution up to 1280x768 @ 60Hz

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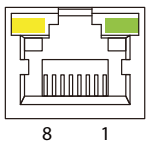
LAN Connectors

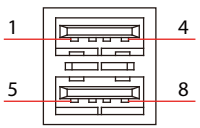
Connector size: RJ-45
Connector Number: 14



Pin	Definition	Pin	Definition
1	TX+	2	TX-
3	RX+	4	N/C1
5	N/C2	6	RX-
7	N/C3	8	N/C4

USB Connector

Connector Number: 15



Pin	Definition	Pin	Definition
1	VCC	2	DATA1-
3	DATA1+	4	GND
5	VCC	6	DATA-
7	DATA+	8	GND

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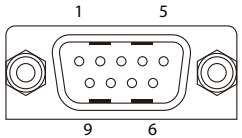
RS422/485 Connector

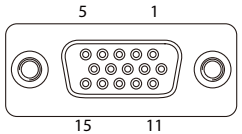
Connector size: DB9, Male
Connector Number: 16



Pin	Definition	Pin	Definition
1	RS422_RX+ / RS485_+	2	RS422_RX- / RS485_-
3	RS422_TX+	4	RS422_TX-
5	GND	6	NC
7	NC	8	NC
9	NC		

VGA Connector

Connector size: DB15, Male
Connector Number: 17



Pin	Definition	Pin	Definition
1	RED	2	GREEN
3	BLUE	4	Gnd
5	Gnd	6	Gnd
7	Gnd	8	Gnd
9	VCC	10	Gnd
11	Gnd	12	DDCDAT
13	Hsync	14	Vsync
15	DDCCLK	16	OPEN

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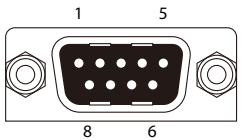
GPIO Connector

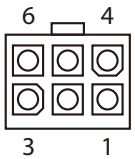
Connector size: DB9, Female
Connector Number: 18



Pin	Definition	Pin	Definition
1	INPUT_1 PORT	2	INPUT_2 PORT
3	INPUT_3 PORT	4	INPUT_4 PORT
5	GND	6	OUTPUT_1 PORT
7	OUTPUT_2 PORT /	8	OUTPUT_3 PORT
9	OUTPUT_4 PORT		

External 12V (4A) & Car Battery (4A) Power and SMBUS

Connector Number: 19



Pin	Definition	Pin	Definition
1	Car battery(4A)	2	VCC12(4A)
3	SMBCLK	4	GND
5	GND	6	SMBDATA

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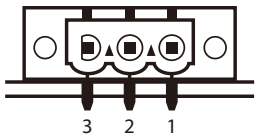
Power Input

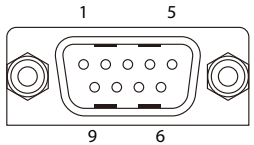
Connector size: 3W3 3PIN 6.85mm DIP
Connector Number: 20



Pin	Definition
1	GND
2	VIN(9V~36V)
3	IGNITION

RS232 Connector

Connector size: DB9, Male
Connector Number: 24



Pin	Definition	Pin	Definition
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

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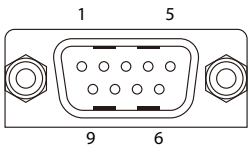
RS422/485 Connector

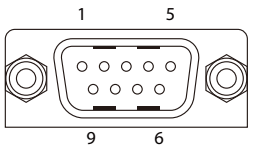
Connector size: DB9, Male
Connector Number: 25



Pin	Definition	Pin	Definition
1	RS485_+	2	RS485_-
3	RS422_TX+	4	RS422_TX-
5	GND	6	NC
7	NC	8	NC
9	NC		

Dual OBDII Module Connector

Connector size: DB9, Male
Connector Number: 26



Pin	Definition	Pin	Definition
1	C1708_2_L	2	CAN2_L
3	CAN1_L	4	C1708_1_L
5	GND	6	C1708_2_H
7	CAN2_H	8	CAN1_H
9	C1708_1_H		

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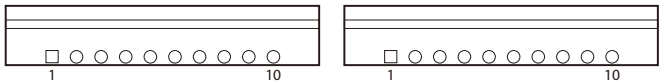
DI/DO Connector

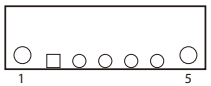
Connector size: Terminal Blocks 10-pin, Male
Connector Number: 27



Pin	Definition	Pin	Definition
1	GND	2	GPI1 / GPO1
3	GPI2 / GPO2	4	GPI3 / GPO3
5	GPI4 / GPO4	6	GPI5 / GPO5
7	GPI6 / GPO6	8	GPI7 / GPO7
9	GPI8 / GPO8	10	GND

Analog Input Connector

Connector size: Terminal Blocks 5-pin, Male
Connector Number: 28



Pin	Definition	Pin	Definition
1	GND	2	VIN1
3	VIN2	4	I-OUT
5	I-IN		

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Chapter 3: Jumpers and Switches

This chapter describes how to set the jumpers on the motherboard.

Before You Begin

- Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.
- Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:
  - A Philips screwdriver
  - A flat-tipped screwdriver
  - A set of jewelers screwdrivers
  - A grounding strap
  - An anti-static pad
- Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nosed pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.
- Before working on internal components, make sure that the power is off. Ground yourself before touching any internal components, by touching a metal object. Static electricity can damage many of the electronic components. Humid environment tend to have less static electricity than dry environments. A grounding strap is warranted whenever danger of static electricity exists.

Precautions

Computer components and electronic circuit boards can be damaged by discharges of static electricity. Working on the computers that are still connected to a power supply can be extremely dangerous.

Follow the guidelines below to avoid damage to your computer or yourself:

- Always disconnect the unit from the power outlet whenever you are working inside the case.
- If possible, wear a grounded wrist strap when you are working inside the computer case. Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Don't flex or stress the circuit board.
- Leave all components inside the static-proof packaging that they shipped with until they are ready for installation.
- Use correct screws and do not over tighten screws.

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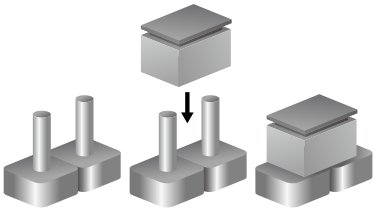
Jumper Settings

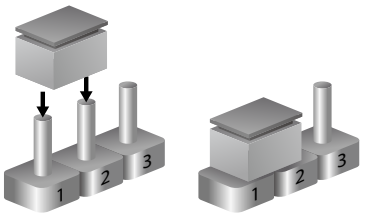
A jumper is the simplest kind of electric switch. It consists of two metal pins and a cap. When setting the jumpers, ensure that the jumper caps are placed on the correct pins. When the jumper cap is placed on both pins, the jumper is short. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is open.

Refer to the illustrations below for examples of what the 2-pin and 3-pin jumpers look like when they are short (on) and open (off).

Two-Pin Jumpers: Open (Left) and Short (Right)



Three-Pin Jumpers: Pins 1 and 2 are Short



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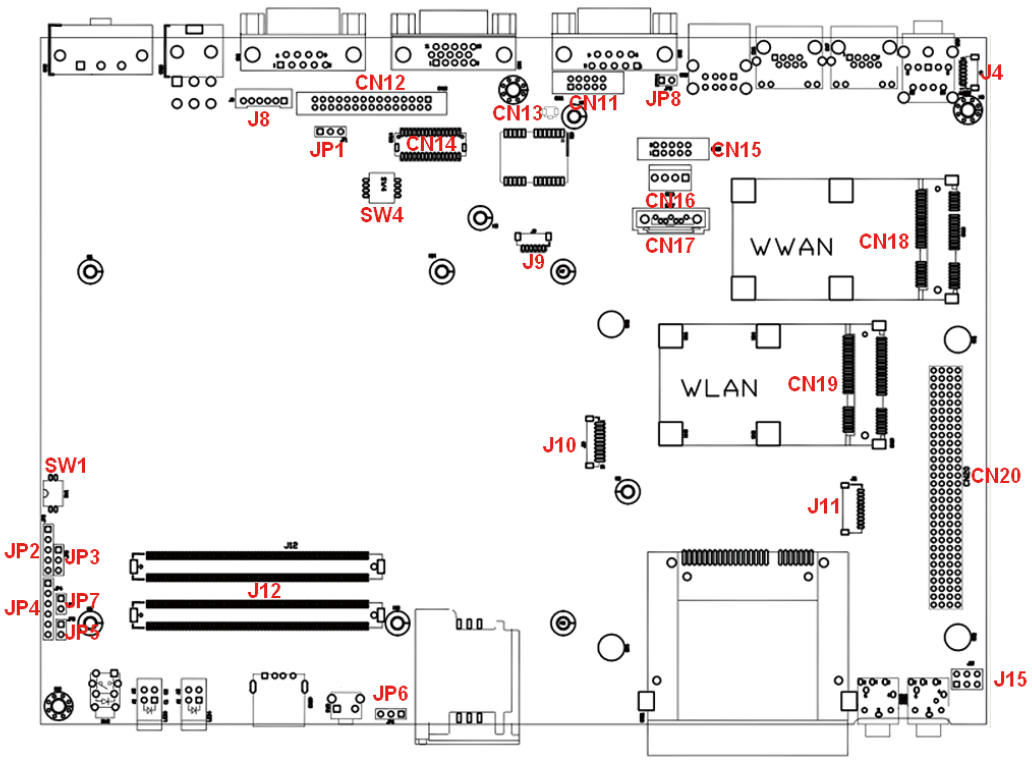
VTC 71 Series Connector Specification & Jumper Setting

VTC 71 Series carrier board placement

The figure below is the VTCB 71 series carrier board which is the board used in the VTC 71 series system. It shows the locations of the jumpers and connectors.

Top View



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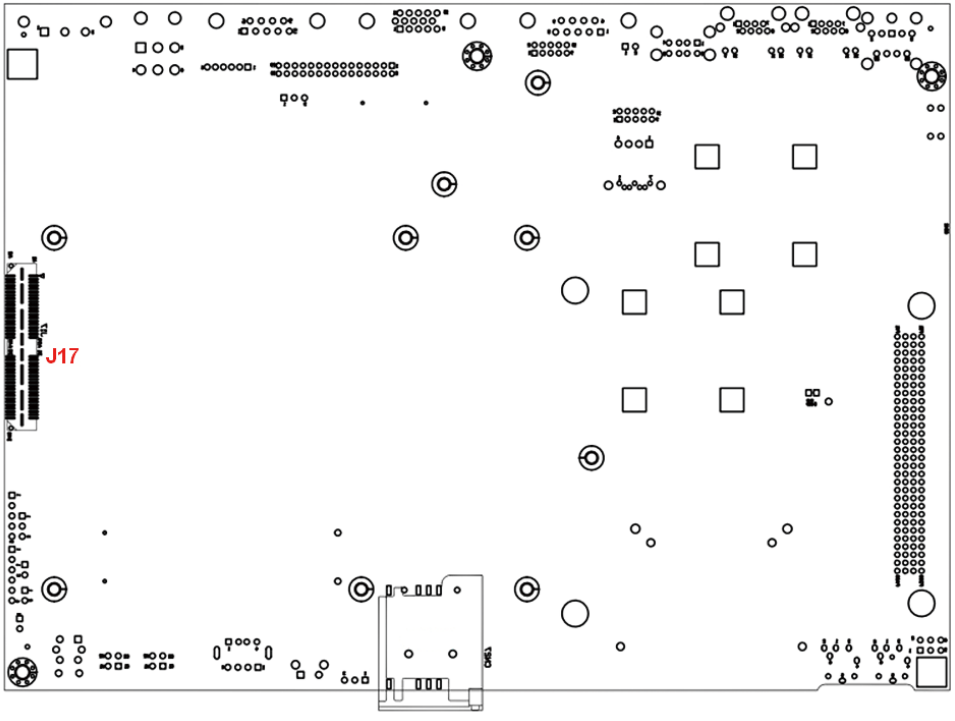
Bottom View



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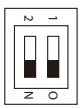
VTC 71 Series Jumpers Setting

CMOS Clear Select

SW2: Power-on Button
SW3: Reset Button
Item B. Start-up & Shut down voltage control
(*) for default seeting

SW1: Voltage setup selection



setup voltage / SW1	12V	24V	9V~36V (*) all can start
SW1.1	OFF	OFF	ON
SW1.2	OFF	ON	Don't Care

SW4: Voltage setup selection

setup voltage / SW1	ON(*)	OFF
SW4.1	GPO0 PULL UP 5V	Don't Care
SW4.2	GPO1 PULL UP 5V	Don't Care
SW4.3	GPO2 PULL UP 5V	Don't Care
SW4.4	GPO3 PULL UP 5V	Don't Care

RS232 – Enable Select

Connector location: JP8

Pin	Status	Function Description
1-2	Short	Disable RS232
1-2(*)	NC	Enable RS232

LVDS Power input Voltage Select

Connector location: JP1

Pin	Status	Function Description
1-2	Short	+5V IN
2-3(*)	Short*	+3.3V IN

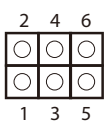
CMOS Input Voltage Select

Connector location: JP6

Pin	Status	Function Description
1-2(*)	Short*	VBAT IN
2-3	Short	Clear CMOS

PCI-104 VI/O Voltage Setting

Connector location: J15



Pin	Status	Function Description
(1-3)(2-4) (*)	Short	+3.3V
(3-5)(4-6)	Short	+5V

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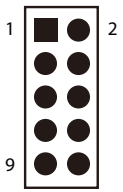
RS232 Connector

Connector size:2 x 5 = 10Pins PIN Header, (2.0 mm Pitch)
Connector location: CN11, CN15



(CN15➔USE TTL SINGNAL)

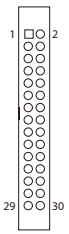
Pin	Definition	Pin	Definition
1	VCC5	2	VCC12
3	NC	4	NC
5	GND	6	GND
7	CAN_DI	8	CAN_DO
9	TXD1	10	RXD1

(CN11➔Standard RS232 interface)

Pin	Definition	Pin	Definition
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	Gnd1	6	DSR1
7	RTS1	8	CTS1
9	RI1		

LVDS Connector+USB0

Connector size: 2 X 15 (2.0mm)
Connector location: CN12



Pin	Definition	Pin	Definition
1	LVDS_CLK	2	LVDS_DAT
3	Panel_VDD	4	LVDS_1(OUT0)
5	LVDS_9(OUT3)	6	LVDS_0(OUT0#)
7	LVDS_8(OUT3#)	8	Panel_VDD
9	LVDS_GND	10	LVDS_GND
11	LVDS_7(CLK)	12	LVDS_3(OUT1)
13	LVDS_6(CLK#)	14	LVDS_2(OUT1#)
15	LVDS_GND	16	LVDS_GND
17	LVDS_5(OUT2)	18	Panel_backlight(+12V)
19	LVDS_4(OUT2#)	20	Panel_backlight(+12V)
21	LVDS_GND	22	Power on push buttom
23	USB_2#	24	USB_GND
25	USB_2	26	USB_VCC (+5V)
27	USB_GND	28	USB_GND
29	Panel_backlight(+12V)	30	GND

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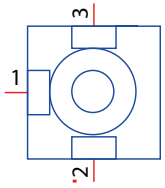
GPS I-PEX Connector

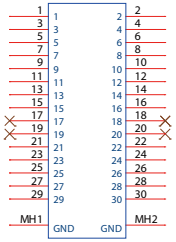
Connector location: CN13



Pin	Definition	Pin	Definition
1	RF_IN_F	2	GND
3	GND	4	

DVI+VGA Connector

Connector size: 2 x 15 = 30Pins PIN Header, (1.0 mm Pitch)
Connector location: CN14



Pin	Definition	Pin	Definition
1	CH_CLK_N	2	DVI_I_5V
3	CH_CLK_P	4	HPDET_I
5	CH_TX0_N	6	DVI_I_DDC_D_R
7	CH_TX0_P	8	DVI_I_DDC_C_R
9	CH_TX1_N	10	CH_GND
11	CH_TX1_P	12	CH_GND
13	CH_TX2_N	14	CH_GND
15	CH_TX2_P	16	CH_GND
17	NC	18	NC
19	NC	20	NC
21	CH_GND	22	VGA1_HSYNC
23	VGA1_RED	24	VGA1_VSYNC
25	VGA1_BLUE	26	VGA1_DDCDAT
27	VGA1_GREEN	28	VGA1_DDCCLK
29	M_DET	30	VGA1_PWR_L

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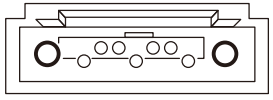
SATA PWR Connector

Connector location: CN16

Pin	Definition	Pin	Definition
1	VCC12	2	GND
3	GND	4	VCC5

SATA Connector

Connector location: CN17



Pin	Definition	Pin	Definition
1	GND	2	SATA_TXP0 -
3	SATA_TXN0	4	GND
5	SATA_RXN0	6	SATA_RXP0
7	GND		

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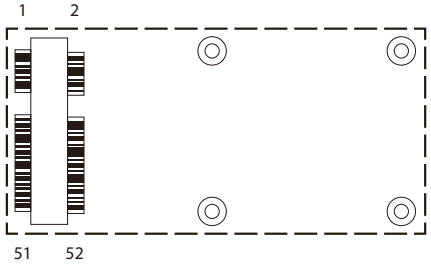
Mini-PCIe (WWAN)

Connector location: CN18



Pin	Definition	Pin	Definition
1	MIC +	2	+V3.3S
3	MIC -	4	GND
5	SPK +	6	NC
7	GND	8	USIM PWR
9	GND	10	USIM DATa
11	VCC_MSM26_DIG	12	USIM CLK
13	NC	14	USIM RST
15	GND	16	NC
17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	NC
23	NC	24	NC
25	NC	26	GND

Pin	Definition	Pin	Definition
27	GND	28	NC
29	GND	30	NC
31	NC	32	NC
33	RESET	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+V3.3S	40	GND
41	+V3.3S	42	LED_WWAN#
43	GND	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	+V3.3S

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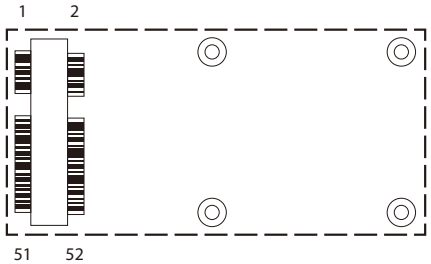
Mini-PCIe (WLAN)

Connector location: CN19



Pin	Definition	Pin	Definition
1	WAKE#	2	+V3.3S
3	NC	4	GND
5	NC	6	+V1.5S
7	CLKREQ#	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3S
25	PERp0	26	GND

Pin	Definition	Pin	Definition
27	GND	28	+V1.5S
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	NC	38	USB_D+
39	NC	40	GND
41	NC	42	LED_WWAN#
43	NC	44	LED_WLAN#
45	NC	46	LED_WPAN#
47	NC	48	+V1.5S
49	NC	50	GND
51	NC	52	+V3.3S

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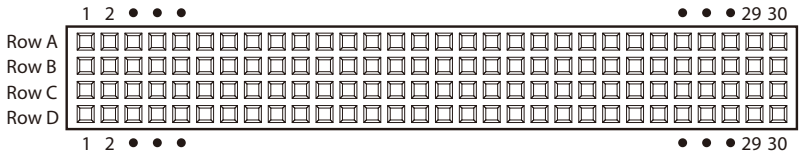
PCI-104 Connector

Connector location: CN20



Pin	A	B	C	D
1	GND	Reserved	+5	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0#	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1#	AD15	+3.3V
9	SERR#	GND	Reserved	PAR
10	GND	PERR#	+3.3V	Reserved
11	STOP#	+3.3V	LOCK#	GND
12	+3.3V	TRDY#	GND	DEVSEL#
13	FRAME#	GND	IRDY#	+3.3V
14	GND	AD16	+3.3V	C/BE2#
15	AD18	+3.3V	AD17	GND

Pin	A	B	C	D
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3#	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0#	GND	REQ1#	VI/O
24	GND	REQ2#	+5V	GNT0#
25	GNT1#	VI/O	GNT2#	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	INTD#	+5V	RST#
29	+12V	INTA#	INTB#	INTC#
30	-12V	REQ3#	GNT3#	GND

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MCU Programmer PIN Header

Connector location: JP2

Pin	Definition	Pin	Definition
1	+3.3ALW	2	C2D
3	MRST	4	C2CK
5	GND		

MCU COM Port

Connector location: JP3

Pin	Function Description
1	TX
2	RX
3	GND

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GAL Programmer PIN Header

Connector location: JP4

Pin	Definition	Pin	Definition
1	VCC3	2	GND
3	TCK	4	TDO
5	TD1	6	TMS

Super I/O Temperature Sensor

Connector location: JP5

Pin	Function Description
1	SENSOR+
2	GND

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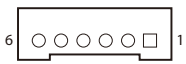
MCU Temperature Sensor

Connector location: JP7

Pin	Function Description
1	SENSOR+
2	GND

LVDS Power Connector

Connector location: J8



Pin	Definition	Pin	Definition
1	Panel_backlight	2	Panel_VDD
3	GND	4	GND
5	LVDS_PANEL	6	LVDS_BIASON

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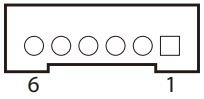
GPS Connector

Connector location: J9

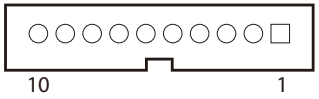


Pin	Definition	Pin	Definition
1	+V3.3S	2	GND
3	SP_RX1	4	SP_TX1
5	GPS_LED#	6	GPS_BAT

NOTE: Onboard uBlox NEO-6Q GPS module can't be used with optional GPS dead reckoning module (VIOB-GPS-DR01) at the same time.

Port80 Connector

Connector location: J10



Pin	Definition	Pin	Definition
1	GND	2	CB_RESET#
3	SIO_CLK	4	LPC_FRAME#
5	LPC_AD3	6	LPC_AD2
7	LPC_AD1	8	LPC_AD0
9	VCC3	10	VCC3

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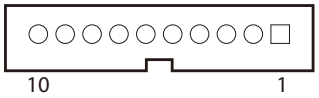
Bluetooth Connector

Connector location: J11



Pin	Definition	Pin	Definition
1	GND	2	USB_6P_L
3	USB_6N_L	4	NC
5	NC	6	BT_AUDIO_EN_R
7	NC	8	BT_3.3V
9	NC	10	GND

Button Power

Connector location: J13

Pin	Function Description
1	GND
2	3.3V

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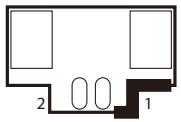
RTC Battery Connector

Connector location: J14



Pin	Definition	Pin	Definition
1	GND	2	VBAT1

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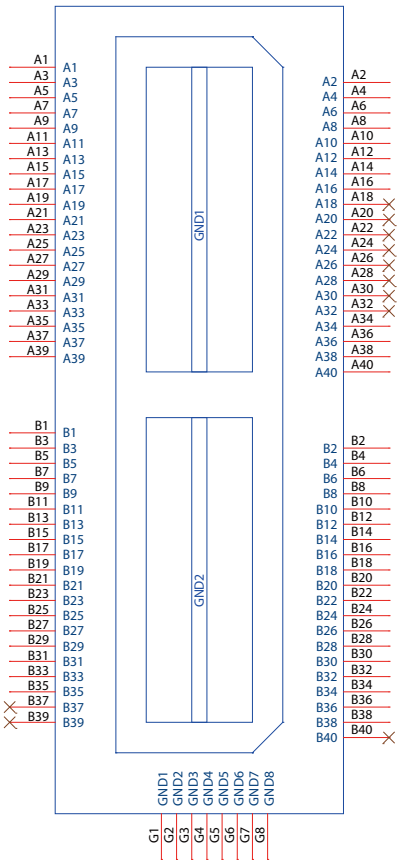
Hi-speed Board to Board Connector

V_MIN= CAR BATTERY OR POE POWER
Connector location: J17



Pin	Definition	Pin	Definition	Pin	Definition	Pin	Definition
A1	V_MIN	A2	GND	A3	V_MIN	A4	GND
A5	V_MIN	A6	GND	A7	V_MIN	A8	GND
A9	V_MIN	A10	GND	A11	V_MIN	A12	GND
A13	V_MIN	A14	GND	A15	V_MIN	A16	IGNITION_X
A17	V_MIN	A18		A19	V_MIN	A20	
A21	V_MIN	A22		A23	V_MIN	A24	
A25	V_MIN	A26		A27	V_MIN	A28	
A29	V_MIN	A30		A31	V_MIN	A32	
A33	V_MIN	A34	PM_SLP_S5#	A35	V_MIN	A36	PM_SLP_S4#
A37	V_MIN	A38	PM_SLP_S3#	A39	V_MIN	A40	I/O POK

Pin	Definition	Pin	Definition	Pin	Definition	Pin	Definition
B1	MINI_CLKP3	B2	MINI_CLKP4	B3	MINI_CLKN3	B4	MINI_CLKN4
B5	GND	B6	GND	B7	PCIE_TXP2	B8	PCIE_RXP2
B9	PCIE_TXN2	B10	PCIE_RXN2	B11	GND	B12	GND
B13	PCIE_TXP3	B14	PCIE_RXP3	B15	PCIE_TXN3	B16	PCIE_RXN3
B17	GND	B18	GND	B19	SATA_TXP2	B20	SATA_RXP2
B21	SATA_TXP2	B22	SATA_RXN2	B23	GND	B24	GND
B25	USB_7P_L	B26	LPC_AD0	B27	USB_7N_L	B28	LPC_AD1
B29	GND	B30	LPC_AD2	B31	SMB_DATA	B32	LPC_AD3
B33	SMB_CLK	B34	LPC_FRAME#	B35	GND	B36	SIO_CLK
B37	NC	B38	CB_RESET#	B39	NC	B40	NC

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High Speed Board-to-Board Connector: COM Express Row A and Row B

Connector size: 2 X 110 = 220 Pin
Connector location: J12A

Row A			
Pin	**Definition**	**Pin**	**Definition**
A1	GND	A2	GBE0_MDI3-
A3	GBE0_MDI3+	A4	NC
A5	NC	A6	GBE0_MDI2-
A7	GBE0_MDI2+	A8	GBE0_LINK#
A9	GBE0_MDI1-	A10	GBE0_MDI1+
A11	GND	A12	GBE0_MDI0-
A13	GBE0_MDI0+	A14	GBE0_CTREF

Row B			
Pin	**Definition**	**Pin**	**Definition**
B1	GND	B2	GBE0_ACT#
B3	LPC_FRAME#	B4	LPC_AD0
B5	LPC_AD1	B6	LPC_AD2
B7	LPC_AD3	B8	NC
B9	NC	B10	LPC_CLK
B11	GND	B12	PWRBTN#
B13	SMB_CK	B14	SMB_DAT

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Pin	Definition	Pin	Definition
A15	SUS_S3#	A16	SATA0_TX+
A17	SATA0_TX-	A18	SUS_S4#
A19	SATA0_RX+	A20	SATA0_RX-
A21	GND	A22	NC
A23	NC	A24	SUS_S5#
A25	NC	A26	NC
A27	BATLOW#	A28	ATA_ACT#
A29	AC_SYNC	A30	AC_RST#
A31	GND	A32	AC_BITCLK
A33	AC_SDOUT	A34	NC
A35	NC	A36	USB6-
A37	USB6+	A38	USB_6_7_OC#
A39	USB4-	A40	USB4+
A41	GND	A42	USB2-
A43	USB2+	A44	USB_2_3_OC#
A45	USB0-	A46	USB0+
A47	VCC_RTC	A48	NC
A49	NC	A50	NC
A51	GND	A52	NC
A53	NC	A54	NC
A55	NC	A56	NC
A57	GND	A58	NC
A59	NC	A60	GND
A61	NC	A62	NC
A63	GPI1	A64	NC
A65	NC	A66	GND
A67	NC	A68	PCIE_TX0+
A69	PCIE_TX0-	A70	GND

Pin	Definition	Pin	Definition
B15	SMB_ALERT#	B16	NC
B17	NC	B18	SUS_STAT#
B19	NC	B20	NC
B21	GND	B22	NC
B23	NC	B24	PWR_OK
B25	NC	B26	NC
B27	NC	B28	NC
B29	NC	B30	AC_SDIN0
B31	GND	B32	SPKR
B33	I2C_CK	B34	I2C_DAT
B35	THRM#	B36	NC
B37	NC	B38	USB_4_5_OC#
B39	USB5-	B40	USB5+
B41	GND	B42	USB3-
B43	USB3+	B44	USB_0_1_OC#
B45	USB1-	B46	USB1+
B47	NC	B48	NC
B49	SYS_RESET#	B50	CB_RESET#
B51	GND	B52	NC
B53	NC	B54	NC
B55	NC	B56	NC
B57	NC	B58	NC
B59	NC	B60	GND
B61	NC	B62	NC
B63	GPO3	B64	NC
B65	NC	B66	NC
B67	NC	B68	PCIE_RX0+
B69	PCIE_RX0-	B70	GND

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Pin	Definition	Pin	Definition
A71	LVDS_A0+	A72	LVDS_A0-
A73	LVDS_A1+	A74	LVDS_A1+
A75	LVDS_A2+	A76	LVDS_A2+
A77	LVDS_VDD_EN	A78	LVDS_A3+
A79	LVDS_A3+	A80	GND
A81	LVDS_A_CK+	A82	LVDS_A_CK-
A83	LVDS_I2C_CK	A84	LVDS_I2C_DAT
A85	NC	A86	NC
A87	NC	A88	PCIE0_CK_REF+
A89	PCIE0_CK_REF-	A90	GND
A91	RSVD	A92	RSVD
A93	NC	A94	RSVD
A95	RSVD	A96	GND
A97	VCC_12V	A98	VCC_12V
A99	VCC_12V	A100	GND
A101	VCC_12V	A102	VCC_12V
A103	VCC_12V	A104	VCC_12V
A105	VCC_12V	A106	VCC_12V
A107	VCC_12V	A108	VCC_12V
A109	VCC_12V	A110	GND

Pin	Definition	Pin	Definition
B71	NC	B72	NC
B73	NC	B74	NC
B75	NC	B76	NC
B77	NC	B78	NC
B79	LVDS_BKLT_EN	B80	GND
B81	NC	B82	NC
B83	LVDS_BKLT_CTRL	B84	VCC_5V_SBY
B85	VCC_5V_SBY	B86	VCC_5V_SBY
B87	VCC_5V_SBY	B88	RSVD
B89	NC	B90	GND
B91	NC	B92	NC
B93	NC	B94	NC
B95	NC	B96	NC
B97	NC	B98	NC
B99	NC	B100	GND
B101	VCC_12V	B102	VCC_12V
B103	VCC_12V	B104	VCC_12V
B105	VCC_12V	B106	VCC_12V
B107	VCC_12V	B108	VCC_12V
B109	VCC_12V	B110	GND

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High Speed Board-to-Board Connector: COM Express Row C and Row D

Connector size: 2 X 110 = 220 Pin
Connector location: J12B

Row C			
Pin	**Definition**	**Pin**	**Definition**
C1	GND	C2	IDE_D7
C3	IDE_D6	C4	IDE_D3
C5	IDE_D15	C6	IDE_D8
C7	IDE_D9	C8	IDE_D2
C9	IDE_D13	C10	IDE_D1
C11	GND	C12	IDE_D14
C13	IDE_IORDY	C14	IDE_IOR#

Row D			
Pin	**Definition**	**Pin**	**Definition**
D1	GND	D2	IDE_D5
D3	IDE_D10	D4	IDE_D11
D5	IDE_D12	D6	IDE_D4
D7	IDE_D0	D8	IDE_REQ
D9	IDE_IOW#	D10	IDE_ACK#
D11	GND	D12	IDE_IRQ
D13	IDE_A0	D14	IDE_A1

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Pin	Definition	Pin	Definition
C15	NC	C16	NC
C17	NC	C18	NC
C19	NC	C20	PCI_GNT0#
C21	GND	C22	PCI_REQ0#
C23	PCI_RESET#	C24	PCI_AD0
C25	PCI_AD2	C26	PCI_AD4
C27	PCI_AD6	C28	PCI_AD8
C29	PCI_AD10	C30	PCI_AD12
C31	GND	C32	PCI_AD14
C33	PCI_C/BE1#	C34	PCI_PERR#
C35	PCI_LOCK#	C36	PCI_DEVSEL#
C37	PCI_IRDY#	C38	PCI_C/BE2#
C39	PCI_AD17	C40	PCI_AD19
C41	GND	C42	PCI_AD21
C43	PCI_AD23	C44	PCI_C/BE3#
C45	PCI_AD25	C46	PCI_AD27
C47	PCI_AD29	C48	PCI_AD31
C49	PCI_IRQA#	C50	PCI_IRQB#
C51	GND	C52	PEG_RX0+
C53	PEG_RX0-	C54	NC
C55	NC	C56	NC
C57	NC	C58	NC
C59	NC	C60	GND
C61	NC	C62	NC
C63	NC	C64	NC
C65	NC	C66	NC
C67	NC	C68	NC
C69	NC	C70	GND

Pin	Definition	Pin	Definition
D15	IDE_A2	D16	IDE_CS1#
D17	IDE_CS3#	D18	IDE_RESET#
D19	NC	D20	NC
D21	GND	D22	PCI_AD1
D23	PCI_AD3	D24	PCI_AD5
D25	PCI_AD7	D26	PCI_C/BE0#
D27	PCI_AD9	D28	PCI_AD11
D29	PCI_AD13	D30	PCI_AD15
D31	GND	D32	PCI_PAR
D33	PCI_SERR#	D34	PCI_STOP#
D35	PCI_TRDY#	D36	PCI_FRAME#
D37	PCI_AD16	D38	PCI_AD18
D39	PCI_AD20	D40	PCI_AD22
D41	GND	D42	PCI_AD24
D43	PCI_AD26	D44	PCI_AD28
D45	PCI_AD30	D46	PCI_IRQC#
D47	PCI_IRQD#	D48	PCI_CLKRUN#
D49	PCI_M66EN	D50	PCI_CLK
D51	GND	D52	SDVOB_RED+
D53	SDVOB_RED-	D54	PEG_LANE_RV#
D55	SDVOB_GREEN+	D56	SDVOB_GREEN-
D57	NC	D58	SDVOB_BLUE+
D59	SDVOB_BLUE-	D60	GND
D61	SDVO_CLK+	D62	SDVO_CLK-
D63	NC	D64	NC
D65	NC	D66	NC
D67	GND	D68	NC
D69	NC	D70	GND

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Pin	Definition	Pin	Definition
C71	NC	C72	NC
C73	NC	C74	NC
C75	NC	C76	GND
C77	NC	C78	NC
C79	NC	C80	GND
C81	NC	C82	NC
C83	NC	C84	GND
C85	NC	C86	NC
C87	GND	C88	NC
C89	NC	C90	GND
C91	NC	C92	NC
C93	GND	C94	NC
C95	NC	C96	GND
C97	NC	C98	NC
C99	NC	C100	GND
C101	NC	C102	NC -
C103	GND	C104	VCC_12V
C105	VCC_12V	C106	VCC_12V
C107	VCC_12V	C108	VCC_12V
C109	VCC_12V	C110	GND

Pin	Definition	Pin	Definition
D71	NC	D72	NC
D73	SDVO_CLK	D74	NC
D75	NC	D76	GND
D77	IDE_CBLID#	D78	NC
D79	NC	D80	GND
D81	NC	D82	NC
D83	NC	D84	GND
D85	NC	D86	NC
D87	GND	D88	NC
D89	NC	D90	GND
D91	NC	D92	NC
D93	GND	D94	NC
D95	NC	D96	GND
D97	PEG_ENABLE#	D98	NC
D99	NC	D100	GND
D101	NC	D102	NC
D103	GND	D104	VCC_12V
D105	VCC_12V	D106	VCC_12V
D107	VCC_12V	D108	VCC_12V
D109	VCC_12V	D110	GND

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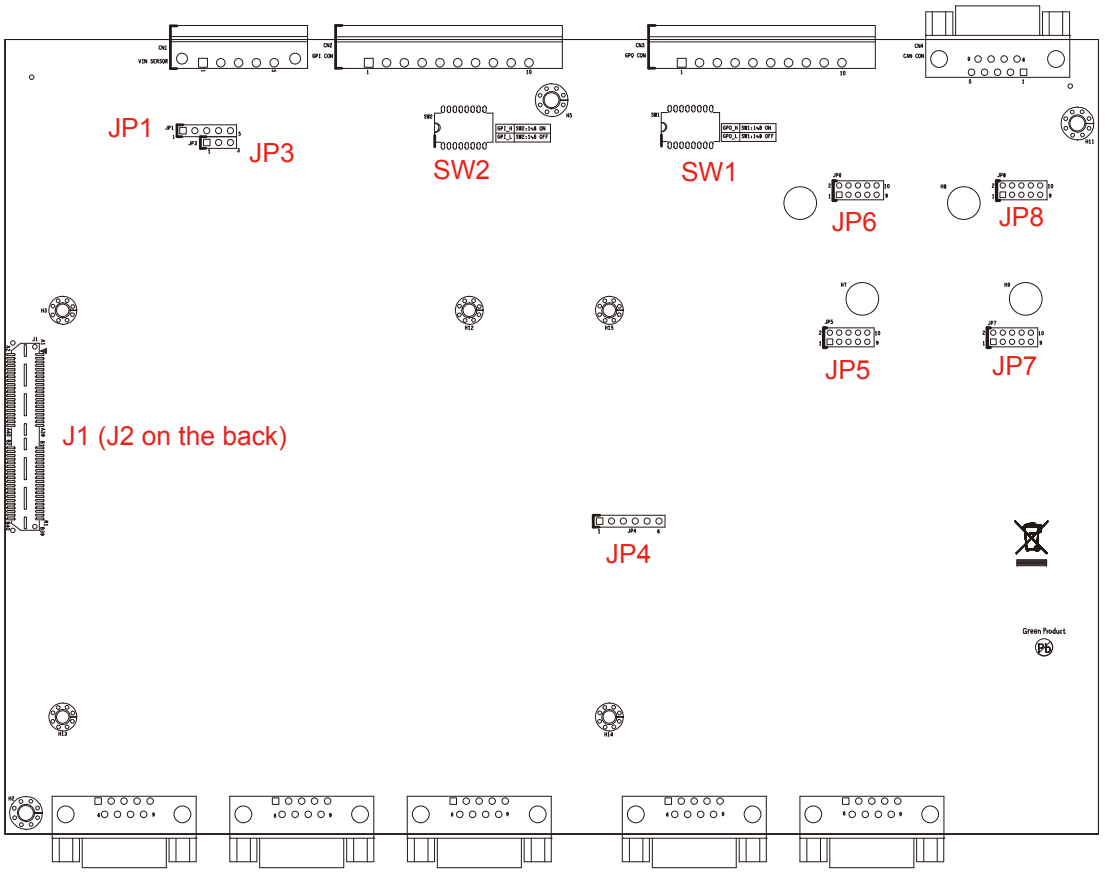
DI/DO board placement

The figure below is the DI/DO board which is the board used in the VTC 71xx-DX series system. It shows the locations of the jumpers and connectors.



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Connector Specification & Jumper Setting

MCU Download Port

Connector size: Connector size: Pin Header 1*5 2.54mm DIP
Connector location: JP1

Pin	Definition
1	VCC3
2	C2D
3	MRST
4	C2CK
5	GND

MCU Debug

Connector size: Pin Header 1*3 2.54mm DIP
Connector location: JP3

Pin	Definition
1	TX
2	RX
3	GND

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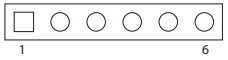
CPLD Download Port

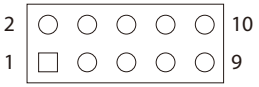
Connector size: Pin Header 1*6 2.54mm DIP
Connector location: JP4



Pin	Definition	Pin	Definition
1	VCC3	2	GND
3	TCK	4	TDO
5	TDI	6	TMS

OBDII Module Input Port

Connector size: Pin Header 2*5 2.0mm DIP
Connector location: JP5/7



Pin	Definition	Pin	Definition
1	TX	2	RX
3	CAN_DI	4	CAN_DO
5	GND	6	GND
7	NC	8	NC
9	VCC5	10	VCC12

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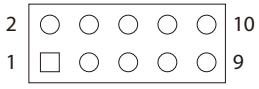
OBDII Module Output Port

Connector size: Pin Header 2*5 2.0mm DIP
Connector location: JP6/8



Pin	Definition	Pin	Definition
1	CAN_H	2	C1708_H
3	CAN_L	4	C1708_L
5	GND	6	GND
7	NC	8	NC
9	NC	10	NC

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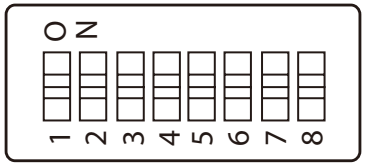
GPO and GPI In/Output Switch

Connector size: 8bit DIP Switch SMT
Connector location: SW1~2



Pin	Definition	Pin	Definition
1~8 ON	GPI Input =Pull High GPO Output = Pull High	1~8 OFF	GPI Input =NC(Low) GPO Output = NC(Low)

VIOB-DIOC GPIO, CAN I/O Setting

GPI State: 0ED1h

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
GPI8	GPI7	GPI6	GPI5	GPI4	GPI3	GPI2	GPI1

GPO State: 0ED2h

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
GPO8	GPO7	GPO6	GPO5	GPO4	GPO3	GPO2	GPO1

CAN BUS State: 0ED3h

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
N/A	N/A	CAN2 Link State 0=No link 1=Link	CAN1 Link State 0=No link 1=Link	CAN Power Reset 0=No Reset 1= Reset	CAN2 Reset 0=No Reset 1= Reset	CAN1 Reset 0=No Reset 1= Rese	N/A

RS422/485 Switch: 0ED4h

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
N/A	N/A	N/A	N/A	N/A	N/A	RS422/485_2 0=RS485 1=RS422	RS422/485_1 0=RS485 1=RS422

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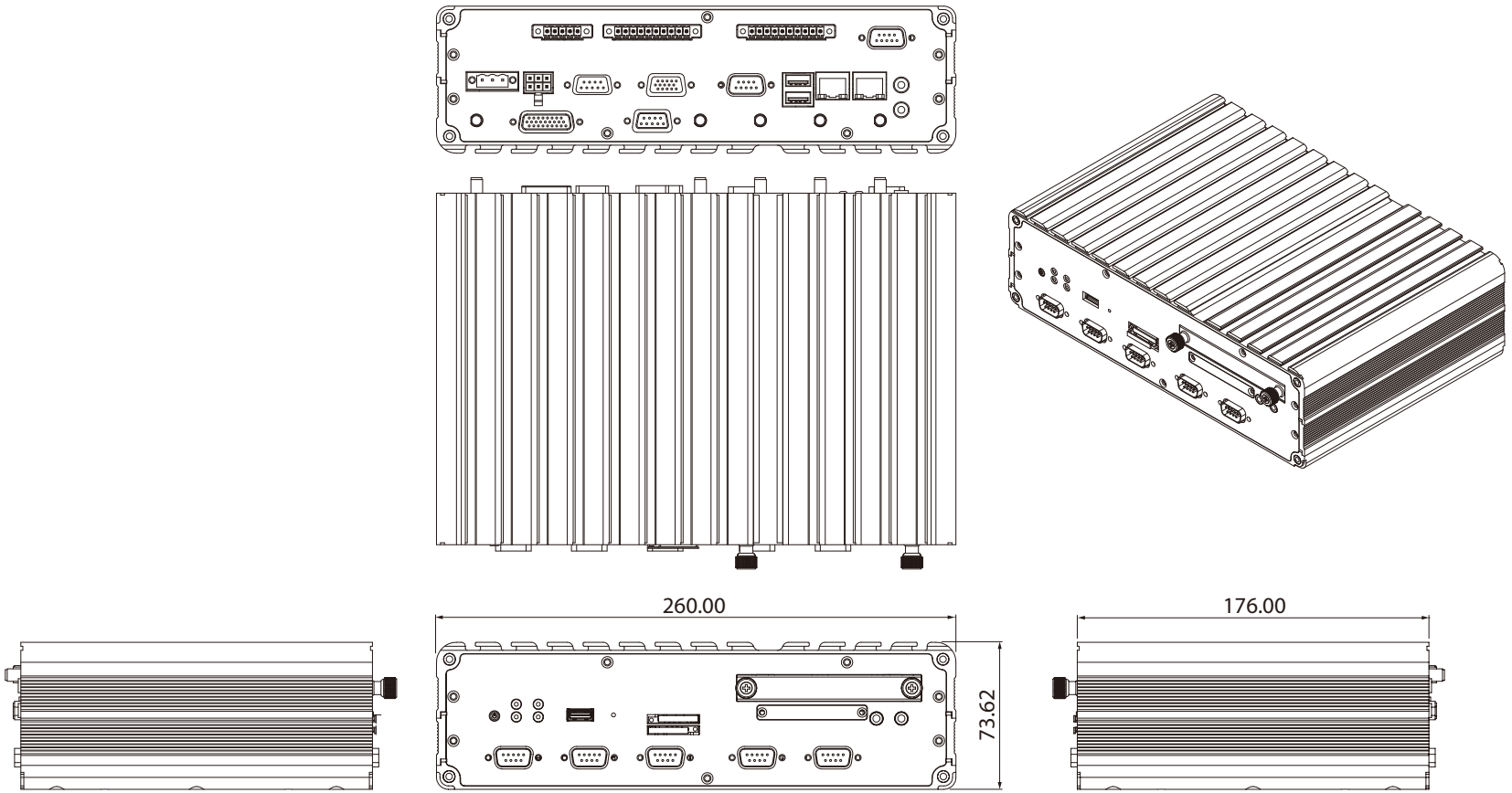
Chapter 4: Mechanical Dimensions

VTC 7100-D1K



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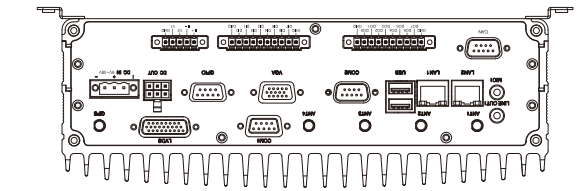
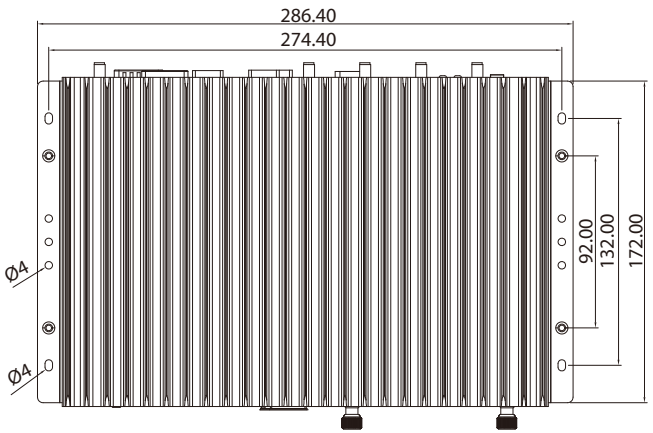
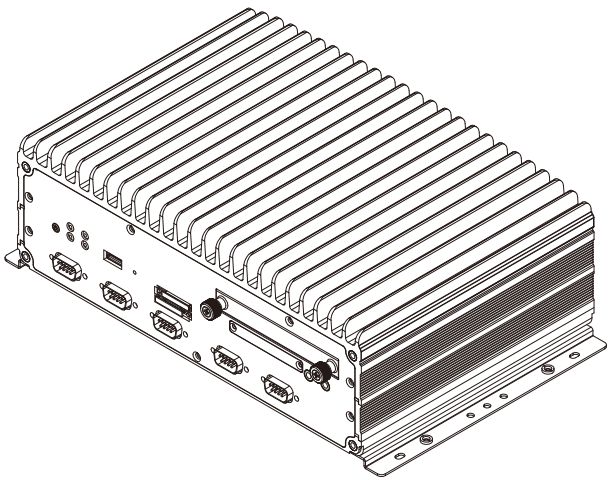
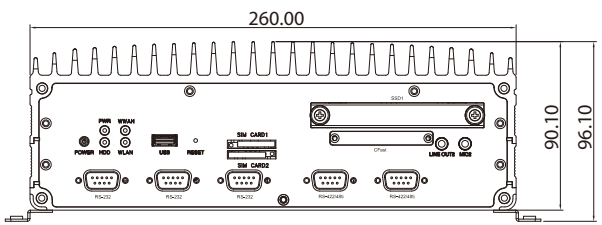
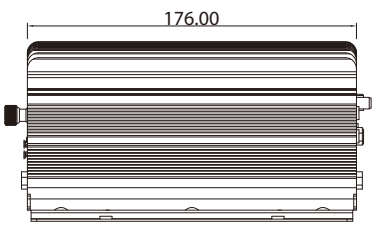
VTC 7110-D1K & VTC 7120-D1K











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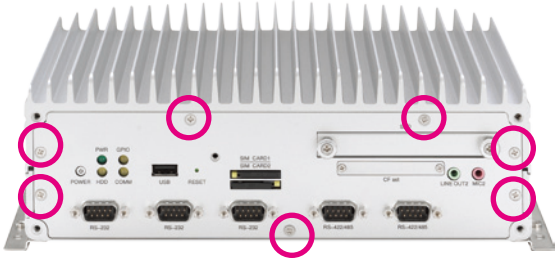
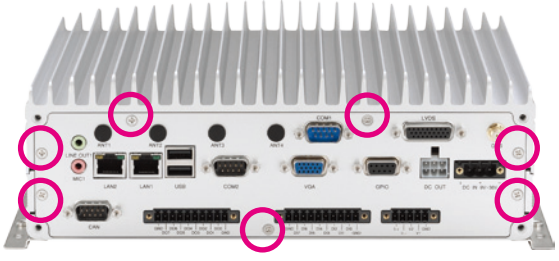
Chapter 5: System Setup

Removing the Chassis Cover

Prior to removing the chassis cover, make sure the unit's power is off and disconnected from the power sources to prevent electric shock or system damage.



Front View



Rear View

Bottom View

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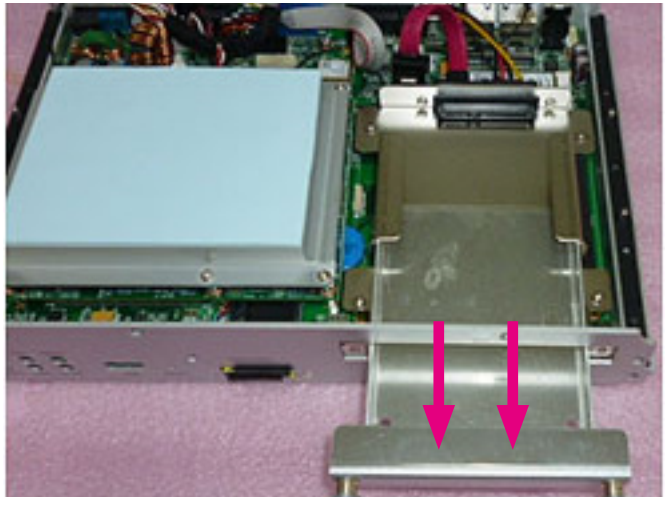
Installing a GPRS/UMTS/HSDPA Module

1. When you want to install the Mini PCI Express card, you have to remove the SSD tray and bracket.
   First, remove the SSD tray.



2. Remove the SSD bracket.

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3. The Mini PCI Express slot shown below is used to install a 3.5G communication module such as GPRS, UMTS or HSDPA module.

4. Insert the module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot.

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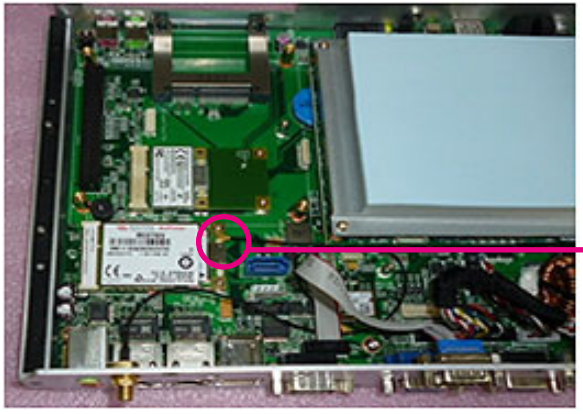
5. Push the module down then secure it with mounting screws.

6. Attach one end of the RF cable onto the module.



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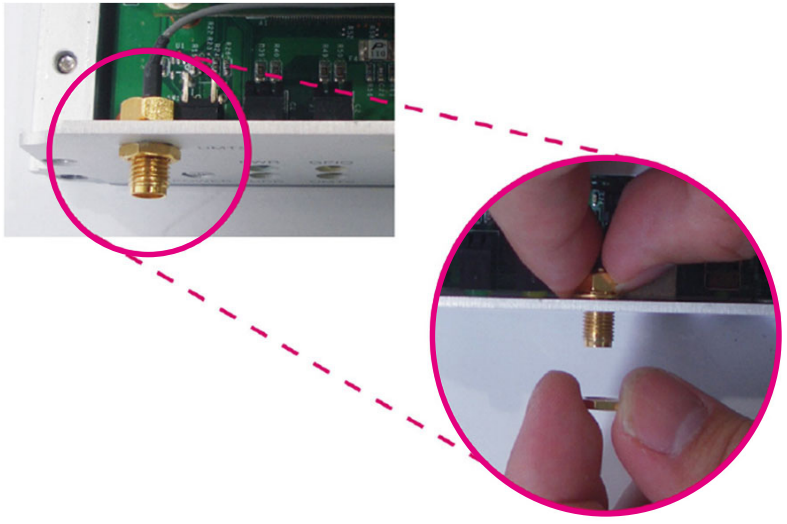
7. Mount the other end of the cable to the antenna mounting hole located at the front panel of the chassis.



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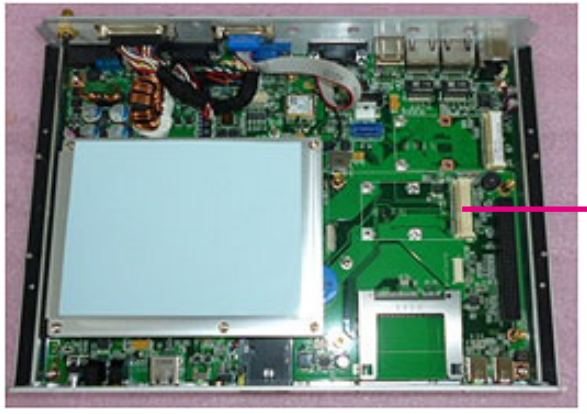
Installing a Wireless LAN Module

1. The Mini PCI Express slot shown below is used to install a wireless LAN module.



2. Insert the wireless LAN module into the Mini PCI Express slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot.

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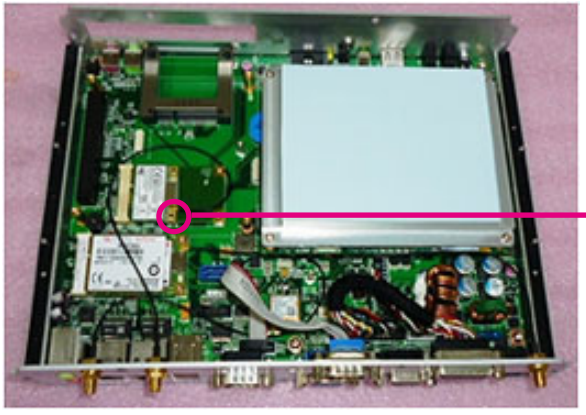
3. Push the module down then secure it with mounting screws.

4. Attach one end of the RF cable onto the module.



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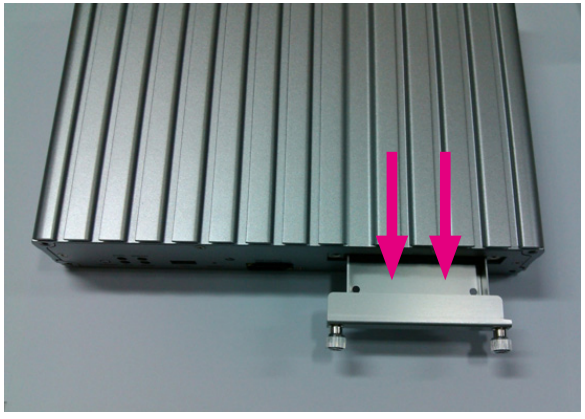
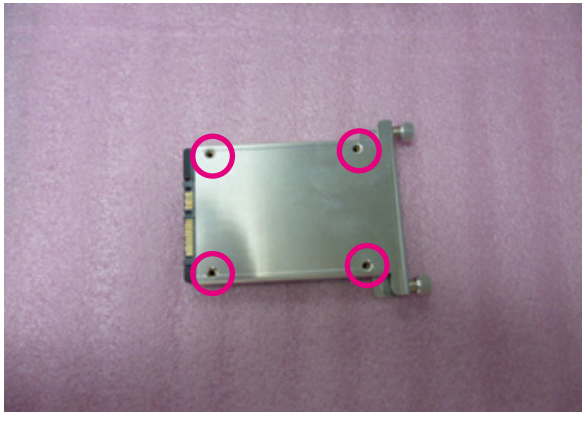
Installing a SATA SSD Drive

1. Remove the SSD tray.



2. Place the SDD drive into the tray and then tighten the four screws.



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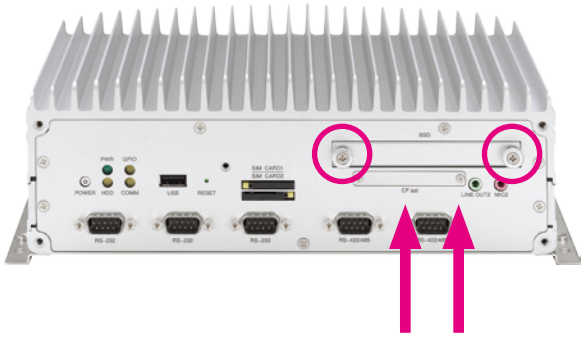
3. Installing the HDD tray, and then tighten the screws to secure the drive to the chassis.



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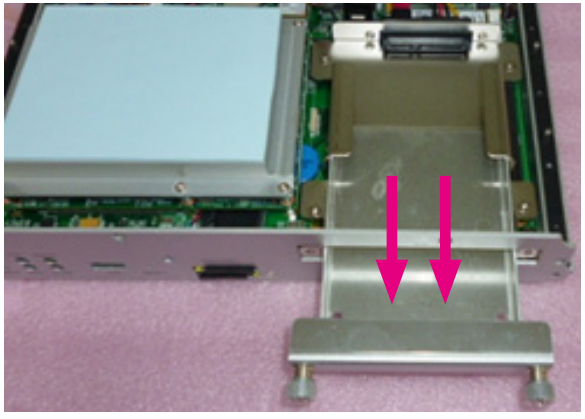
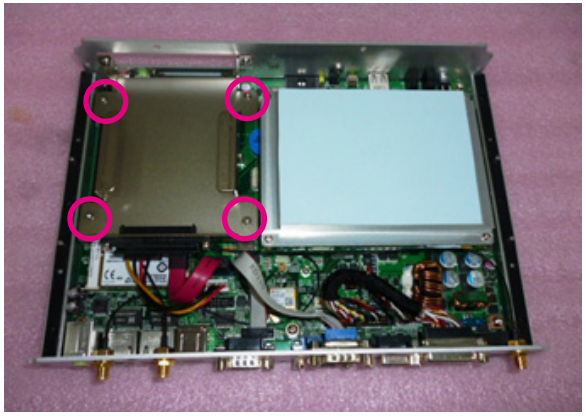
Installing the PCI-104 Module

1. When you want to install the PCI-104 card, you have to remove the SSD tray and bracket.
   First, remove the SSD tray.



2. Remove the SSD bracket.



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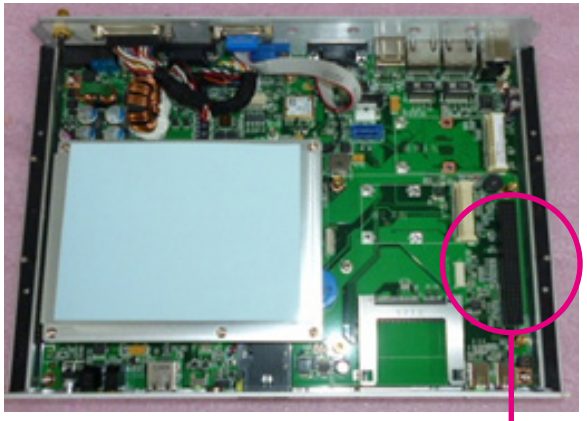
3. The PCI-104 slot shown below is used to install a PCI-104 module.



Mini PCI
Express slot

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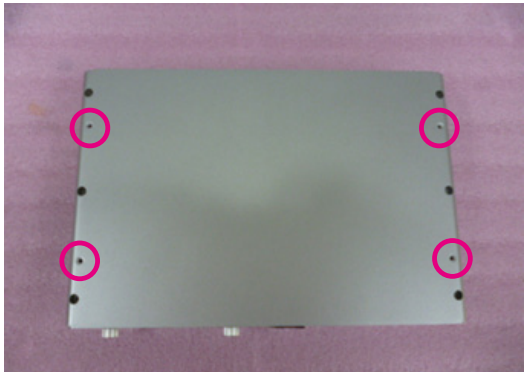
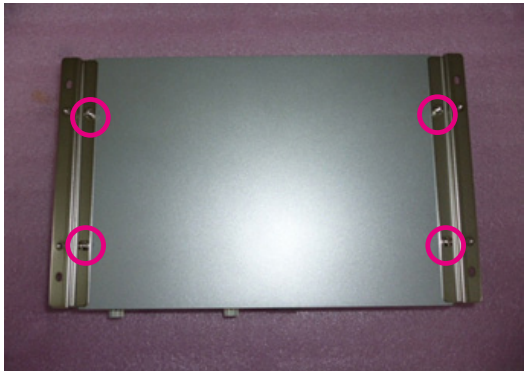
Rackmount Brackets

The rackmount brackets provide a convenient and economical way of mounting the system on the wall.

1. The mounting holes are located at the bottom of the system. Secure the brackets on each side of the system using the provided mounting screws.





2. Now mount the system on the wall by fastening screws through the bracket's mounting holes.

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Chapter 6: Driver Installation

When you want to install the VTC 71 series driver, please refer to the following steps, it will help you with the driver installation.

Note: Please change the path according to the product name.

Step 1. Installing the Intel® Chipset driver
Please access the folder: \\VTC7110\Chipset Driver
After successful installation, please restart the VTC

Step 2. Installing the Graphic driver
Please access the folder: \\VTC7110\Graphic Driver
After successful installation, please restart the VTC

Step 3. Installing the ME driver
Please access the folder: \\VTC7110\ME Driver

Step 4. Installing the LAN driver
Please access the folder: \\VTC7110\LAN Driver

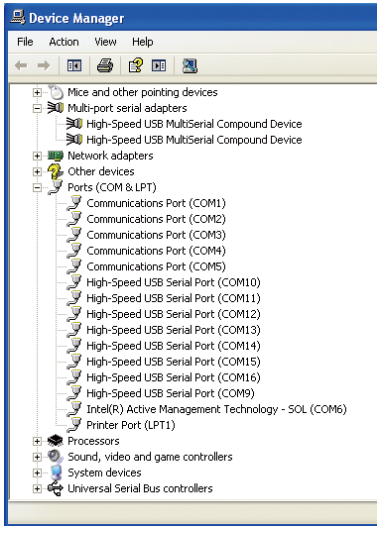
Step 5. Installing the Audio driver
Please access the folder: \\VTC7110\Audio Driver
After successful installation, please restart the VTC

Step 7. Installing the WLAN module driver
Please access the folder: \\VTC7110\Module Driver\WLAN Module\

Step 8. Installing the WWAN module driver
Please access the folder: \\VTC7110\Module Driver\WWAN Module\

After the driver is sucessfully installed, 8 sets will be added under the COM ports section in Windows "Device Manager".

COM9 is for CAN1(9600bps)
COM10 is for CAN2(9600bps)
COM11 is for Analog sensor(115200bps)
COM12~14 is for RS-232(CN5~CN7)
COM15~16 is for RS-422/485(CN8~CN9)



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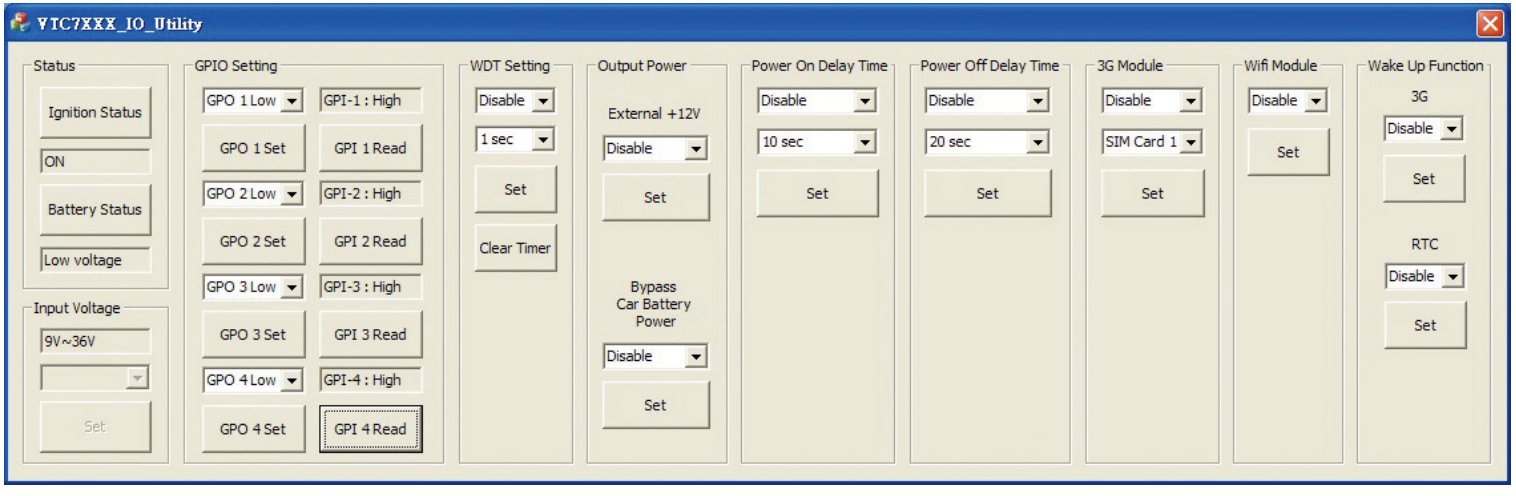
Appendix A:
Software Demo Utility for I/O Ports of Function Control

NEXCOM's software demo utility enables users to test and control different I/O port functions on the VTC 71 Series. This document shows how to use the utility.

There are also source code files of the utility in the CD. Users can refer to the source codes to develop their applications.

Menu Screen



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1.1 Status

1.1.1 Ignition Status

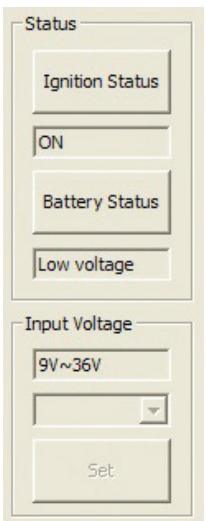
Press the button of Ignition Status, the signal of ignition will be shown.
ON …… Signal of ignition is high.
OFF ….. Signal of ignition is low.

1.1.2 Battery Status

Press the button of Battery Status, the status of battery voltage will be shown.
Low voltage …… Signal of ignition is high.
OFF ……..…….. Signal of ignition is low.

1.1.3 Input Voltage

Shows the setting of input voltage in BIOS.



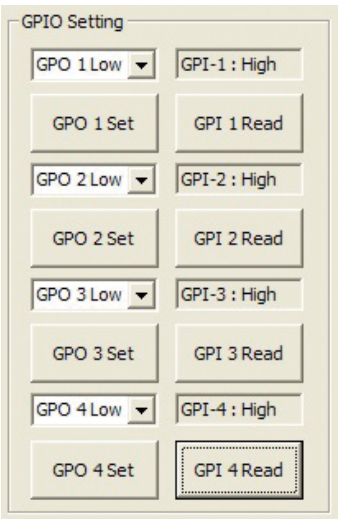
1.2 GPIO

1.2.1 GPO Setting

Press the button of Ignition Status, the signal of ignition will be shown.
ON …… Signal of ignition is high.
OFF ….. Signal of ignition is low.

1.2.2 GPI Reading

Reads the status of GPI.



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1.3 WDT Setting

Enables or disables the WDT function. There are 8 selections of time. The timer of WDT can also be cleared by button.

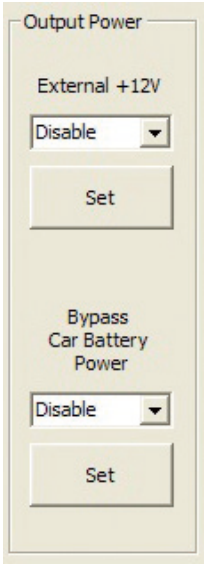
1.4 Output Power

1.4.1 External +12V

Enables or Disables the output of 12VDC.

1.4.2 Bypass Car Battery Power

Reads the status of GPI.



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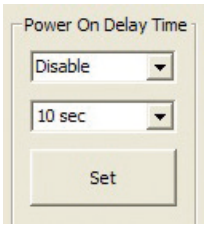
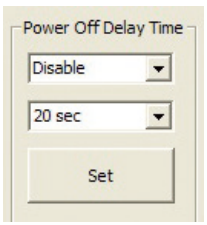
1.5 Power On Delay Time

Enables or disables the power on delay time function. There are 8 selections of delay time.



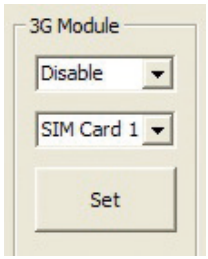
1.6 Power Off Delay Time

Enables or disables the power off delay time function. There are 8 selections of delay time.



1.7 3G Module

Enables or disables WWAN module function. SIM card 1 or SIM card 2 can also be selected for the WWAN module on mini-PCIe socket (CN18).



1.8 WLAN Module

Enables or disables WLAN function for the WLAN module on mini-PCIe socket (CN19).

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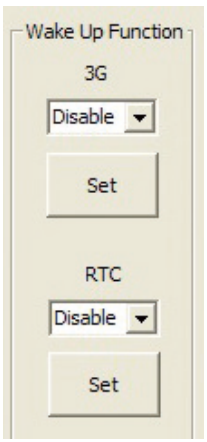
1.9 Wake Up Function

1.9.1 3G

Enables or disables the wake up function for the WWAN module on mini-PCIe socket (CN18).

1.9.2 RTC

Enables or disables the RTC wake up function. The timer setting of RTC is located in BIOS setting.



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Appendix B: Using the GPS Feature

u-blox NEO-6Q GPS Module Specification

Receiver Type	50-channel u-blox 6 engine
	GPS L1 C/A code
	SBAS: WAAS, EGNOS, MSAS
Navigation Update Rate	Up to 5 Hz
Accuracy	Position: 2.5 m CEP
	SBAS: 2.0 m CEP
Acquisition	Cold starts: 26s
	Aided starts2: 1s
	Hot starts: 1s
Sensitivity	Tracking: –162 dBm
	Cold starts: –148 dBm
	Hot starts: –157 dBm

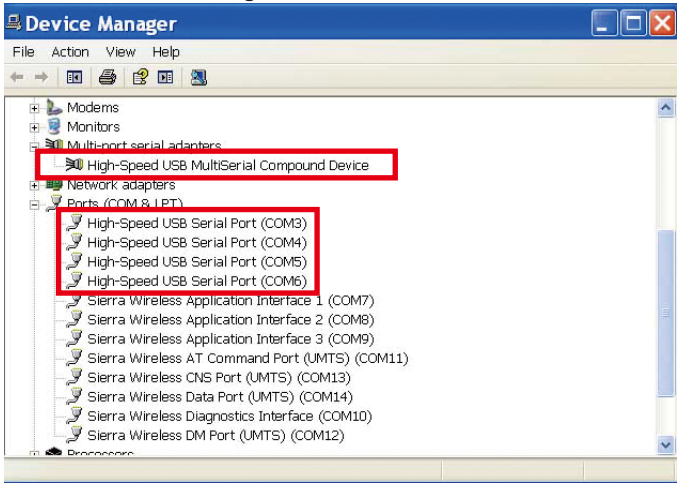
The VTC has a built-in u-blox NEO-6Q GPS receiver module by default. Global Positioning System (GPS) uses a constellation of 50 medium earth orbit satellites to transmit and receive microwave signals to determine its current location.

You need to install the third-party GPS navigation software to take advantage of the GPS feature.

Setup and Using GPS Information

Users can use the GPSinfo.exe program to verify that the GPS is correctly configured and working properly. Also, users can use the GPSinfo.exe program to enable WAAS/EGNOS and power saving mode.

1. Go to Device Manager to ensure the device is installed correctly.


Device Manager
File Action View Help
Modems
Monitors
Multi-port serial adapters
High-Speed USB MultiSerial Compound Device
Network adapters
Ports (COM & LPT)
High-Speed USB Serial Port (COM3)
High-Speed USB Serial Port (COM4)
High-Speed USB Serial Port (COM5)
High-Speed USB Serial Port (COM6)
Sierra Wireless Application Interface 1 (COM7)
Sierra Wireless Application Interface 2 (COM8)
Sierra Wireless Application Interface 3 (COM9)
Sierra Wireless AT Command Port (UMTS) (COM11)
Sierra Wireless CNS Port (UMTS) (COM13)
Sierra Wireless Data Port (UMTS) (COM14)
Sierra Wireless Diagnostics Interface (COM10)
Sierra Wireless DM Port (UMTS) (COM12)

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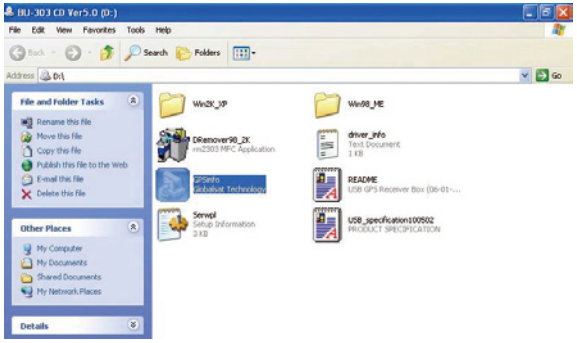
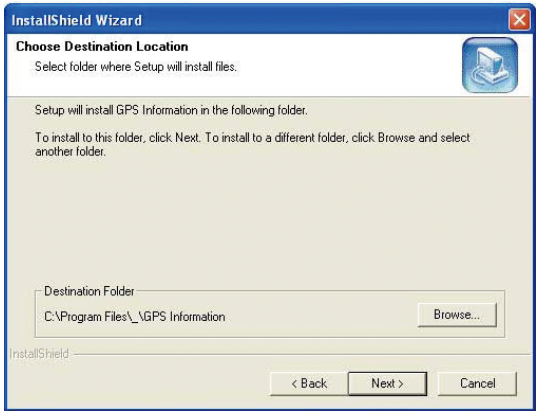
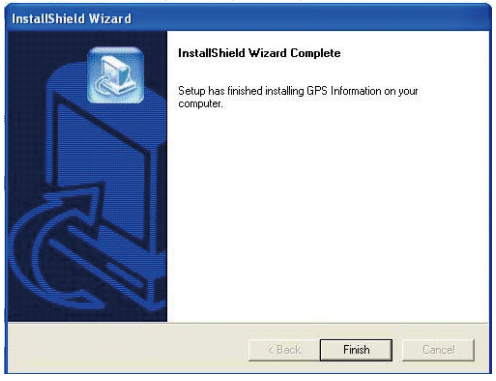
2. Insert the Installation Disc into CD-Rom drive and execute the "Gpsinfo.exe" file (the file also saved in C:\Utility\GPS_Utility).



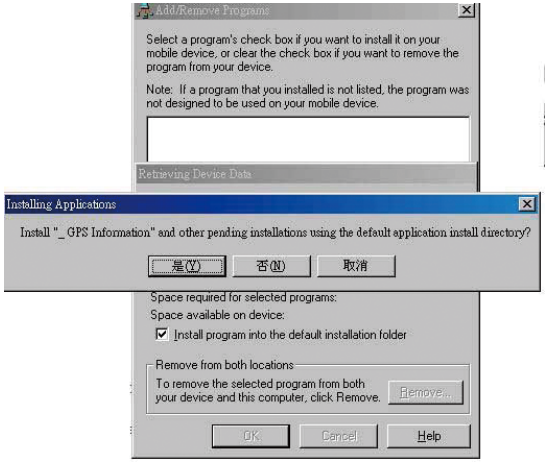
3. Follow the given instructions to complete the installation.


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install GPS Information in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files_\GPS Information
Browse...
InstallShield
< Back
Next >
Cancel

4. When the setup complete, press <Finish>.



5. Once the installation is completed, installation of GPS Information onto PDA device will be launched automatically. Select <Yes> to continue.


Add/Remove Programs
Select a program's check box if you want to install it on your mobile device, or clear the check box if you want to remove the program from your device.
Note: If a program that you installed is not listed, the program was not designed to be used on your mobile device.
Retrieving Device Data
Installing Applications
Install "_ GPS Information" and other pending installations using the default application install directory?
是(Y)
否(N)
取消
Space required for selected programs:
Space available on device:
Install program into the default installation folder
Remove from both locations
To remove the selected program from both your device and this computer, click Remove.
Remove...
OK
Cancel
Help

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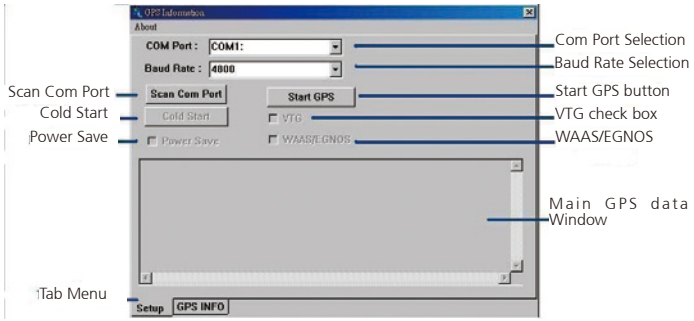
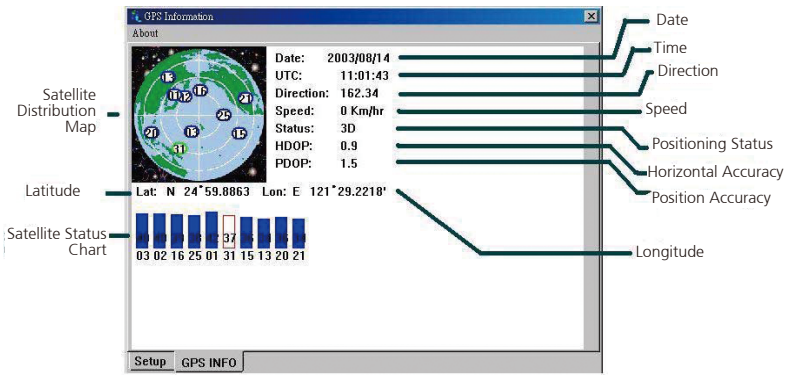
Setup Window Screenshot

Double click GpsInfo_Vista icon from Desktop to start GPS.



- Scan Com Port" - Scan all available communication port for GPS reception
- "Cold Start" - Cold start the GPS receiver
- "Power Save" - Check the box to enable/disable the Power Save Mode (the option is available only when a GPS device is found)
- "Tab Menu" - Switch between Setup and GPSINFO windows
- "Com Port Selection" - Select the appropriate communication port where GPS receiver is configured (it may be necessary to try several communication ports until the right one is found)
- "Baud Rate Selection" - Select the appropriate transferring rate **(Please set the baud rate at 9600)**
- "Start GPS button" - Turn on/off the GPS device
- "VTG check box" - Some navigation or map software requires to receive VTG data output for during operation. Check the box to activate the VTG data output.
- "WAAS/EGNOS" - Check the box to activate WAAS/EGNOS in order to increase the accuracy of positioning
- "Main GPS data Window" - Display data received by GPS device.

GPS Info Window Screenshot



- "Satellite Distribution Map" – Display the position of all connected Satellites
  - A unique number is assigned to each satellite.
  - Red circle indicates that the satellite location is known from almanac information; however, the satellite is not currently being tracked.
  - Green circle indicates that the satellite is being tracked; how ever, it is not being used in the current position solution.
  - Blue circle indicates that is being tracked and is being used in the current position.

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- "Latitude" – User's current latitude is displayed in N/S degree (North/ South Hemisphere) format
- "Satellite Status Chart" – display the status of each connected satellite
  - The number under each bar marks corresponding Satellite, and the height of each bar represents the strength of the satellite.
  - Red bar indicates that the satellite location is known from almanac information; however, the satellite is not currently being tracked.
  - Green solid bar indicates that the satellite is being tracked; however, it is not being used in the current position solution.
  - Blue bar indicates that the tracked and is being used in the current position.
- "Date" – display the current date in (dd/mm/yy) format.
- "Time" – display the current (UTC) time in (hh:mm:ss) format.
- "Direction" – display the current direction from 000.0° to 359.9°
- "Speed" – Display the current moving speed in km/hour
- "Positioning Status"- Three Modes
  1. No Fix
  2. 2D Positioning
  3. 3D Positioning
- "Horizontal Accuracy" - Range from 0.5 to 99.9, the smaller the better
- "Position Accuracy" - Range from 0.5 to 99.9, the smaller the better
- "Longitude" – Display current longitude in E/W (East/West Hemisphere) Time (hhmmss)

GPS Information Instructions

1. Make sure that the GPS device is properly inserted.
2. Start GPS Information Software.
3. Choose and select the proper communication port. (It might be necessary to try each available port to find the right one since the default communication port varies according to different hardware device.)
4. Click "Start GPS button" to activate the GPS receiver.
5. Upon successful connection, GPS output data should be displayed in "Main GPS data Window". If no data is observed, make sure the GPS receiver is working and properly inserted. Otherwise choose another communication port.
6. Satellite status can be observed in the "GPS Info Window". Use the "Tab Menu" to switch between Setup window and GPS info window.
7. Please make sure to de-activate the GPS device before exiting this program.

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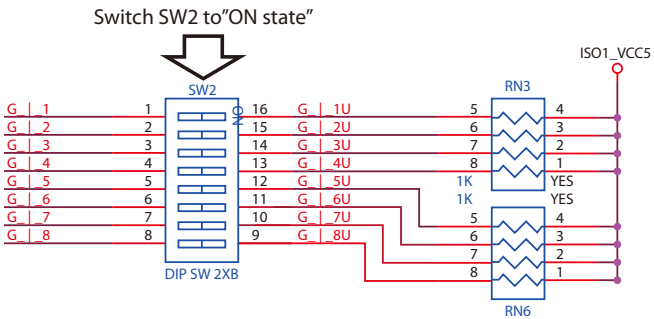
Appendix C: Signal Connection of GPO, GPI, Analog Voltage Input and Analog Current Input

VTC 7100-D1K/ 7110-D1K/ 7120-D1K is equipped with VIOB-DIOC that support isolated COM ports, isolated GPIO and analog inputs. Its digital input/ output and analog input is through the screw terminal connectors. CN1 connector contains analog voltage and analog current signal, CN2 for eight digital input signal and CN3 for eight digital output signal. For the connector specification and jumper setting, please refer the section of connector specification VTC 7100-D1K/ 7110-D1K/ 7120-D1K.

To ensure your application is sending and receiving data correctly, please refer the signal connection.

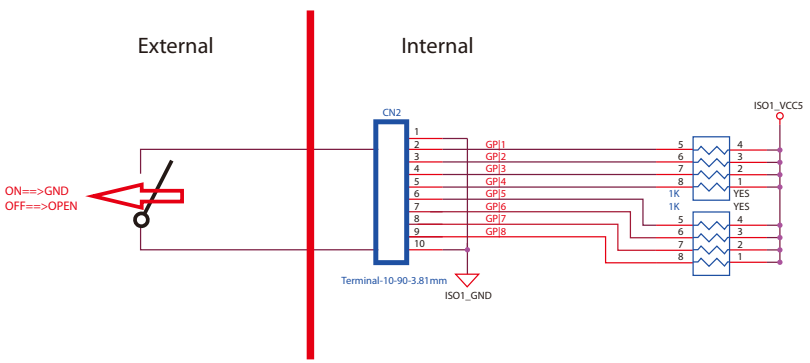


Digital Input

CN2 connector for GPI signal (digital signal input)
The CN2 has 8 isolated digital input channels. Each channel can accept 0~30Vdc voltage input. The signal connection of CN2 support two connected methods for input signal type.

Dry Contact:
The SW2 to need switch to "ON" state. The GPI signal will have a pull up resistor to 5V internally when you switch "SW2" to "ON" state.

The figure below shows how to connect an external output source to one of isolated input channel.



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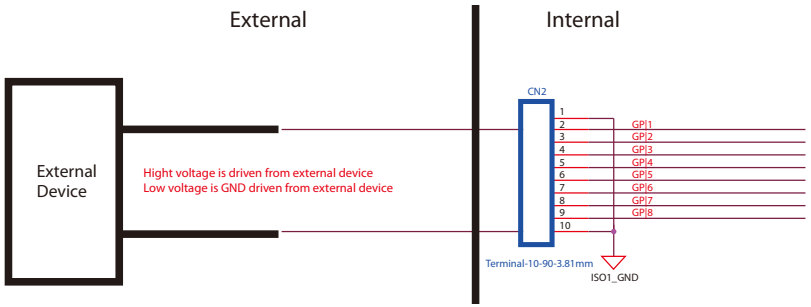
Wet Contact:
The SW2 need to switch to "OFF" state. The GPI signal will have no pull up resistor internally when you switch "SW2" to "OFF" state.

In this case, the external input signal will have a voltage of high level by itself. The maximum voltage of high level can be accepted up to 30Vdc.

The figure below shows how to connect an external output source to one of isolated input channel.

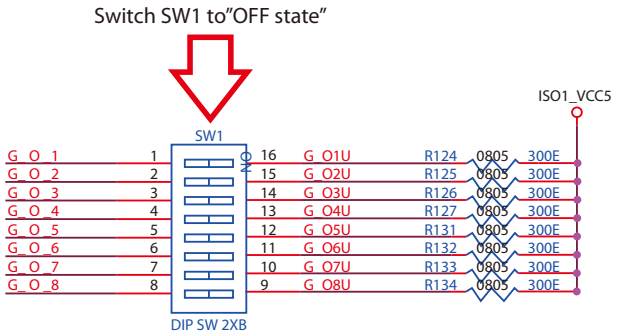


Digital Output

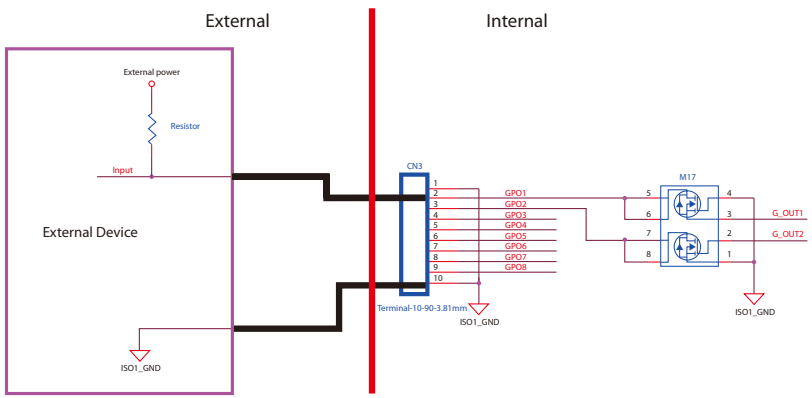
CN3 connector for GPO signal (digital signal output)
The CN3 has 8 isolated digital output channels. Each channel can accept 0~30Vdc voltage. And it is able to drive 500mA current for low level. The signal connection of CN3 support two connected methods for output signal type.

Dry Contact:
The SW1 to need switch to "OFF" state. The GPO signal will no have a pull up resistor internally when you switch "SW1" to "OFF" state.

The output signal will has two state, one is low level (driven to 0V from GPO signal) other is open (high voltage is provided from external device).



The figure below shows how to connect an external input source to one of isolated output channel.



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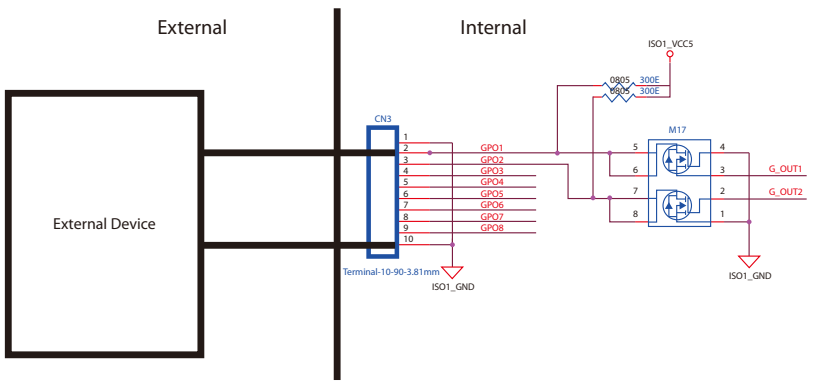
Wet Contact:
The SW1 to need switch to "ON" state. The GPO signal will have a pull up resistor to 5V internally when you switch "SW1" to "ON" state. The output signal will has two state, one is low level (driven to 0V from GPO signal) other is high level (driven to 5V from GPO signal).

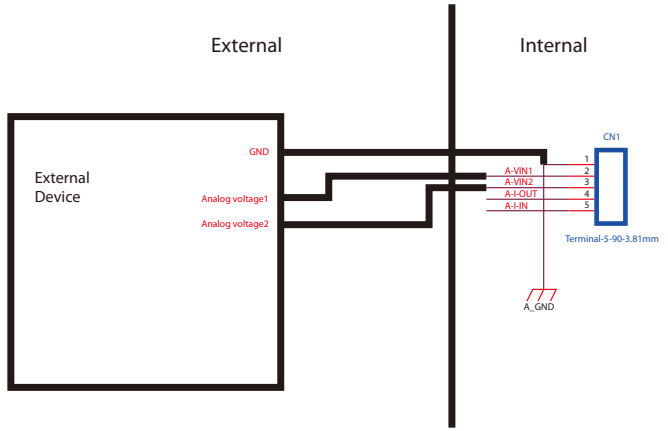
The figure below shows how to connect an external input source to one of isolated output channel.



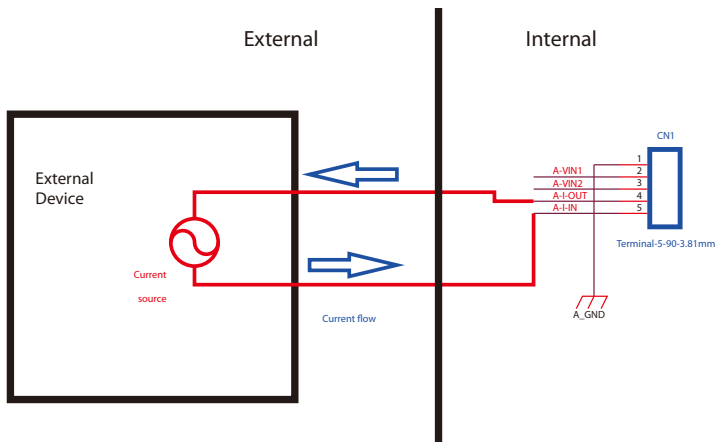
Analog Input

CN1 connector for analog input signal
The CN1 has two single end input of analog voltage and one differential input of analog current. Analog voltage can accept 0~12Vdc voltage input. And analog current can accept 0~10A current input

1. Single end of analog voltage contacts from external device.



2. Differential signal of analog current contacts from external device.



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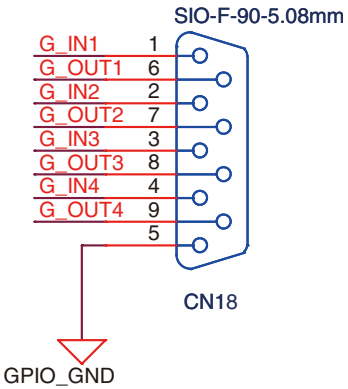
Appendix D: Signal Connection of DI/DO

GPIO Pinout Description

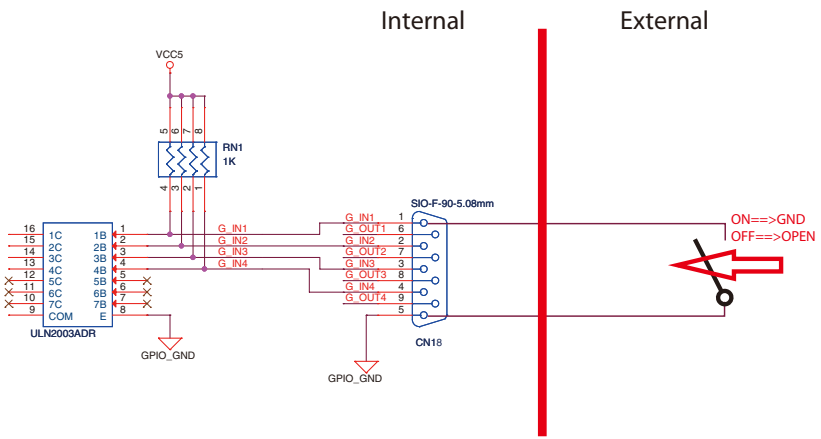


Digital Input

CN18 connector for GPI signal (digital signal input)
The CN18 has 4 digital input channels.

Dry Contact (default)
The GPI signals have a pull up resistor to 5V internally.

The figure below shows how to connect an external output source to one of the input channel.



Wet Contact:
Please contact sales for further information.

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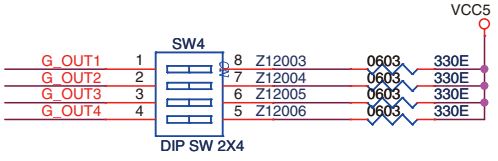
Digital Output

CN18 connector for GPO signal (digital signal output)
The CN18 has 4 digital output channels. Each channel can accept 0~30Vdc voltage. And it is able to drive 250mA current for low level. The signal connection of CN18 support two connected methods for output signal type.

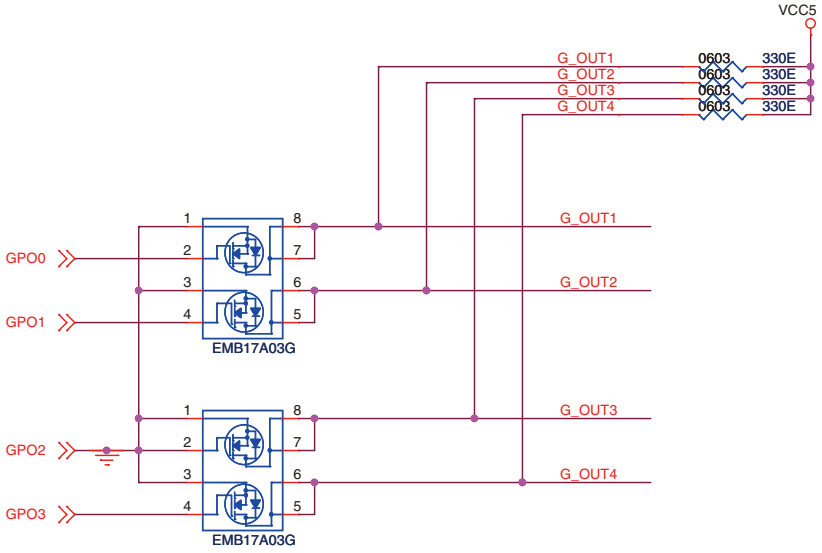
The output signal has two states, one is low level (driven to 0V from GPO signal) other is open (high voltage is provided from external device).



GPO (SW4)	
On	Pull up VCC5
Off	Don't Care

Wet Contact (default)
The SW4 needs to switch to "ON" state. The GPO signal will have a pull up resistor to 5V internally when you switch "SW1" to "ON" state. The output signal has two states, one is low level (driven to 0V from GPO signal) other is high level (driven to 5V from GPO signal).

The figure below shows how to connect an external input source to one of the isolated output channel.



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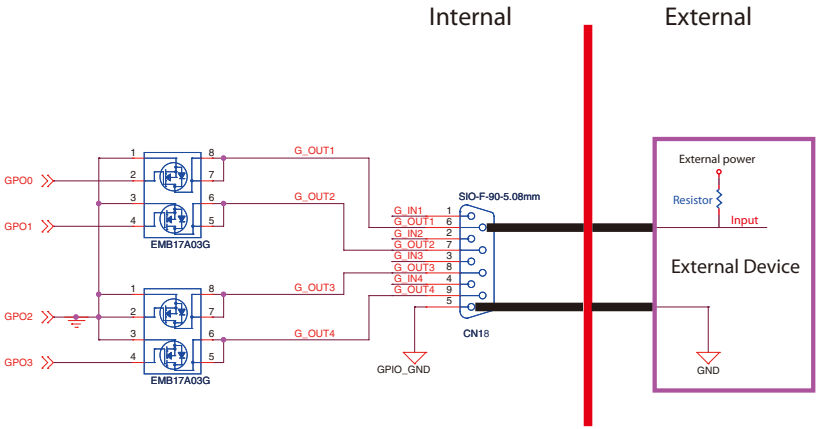
Dry Contact

The SW4 needs to switch to “OFF” state. The GPO signal will no have a pull up resistor internally when you switch “SW4” to “OFF” state.

The figure below shows how to connect an external input source to one of the output channel.



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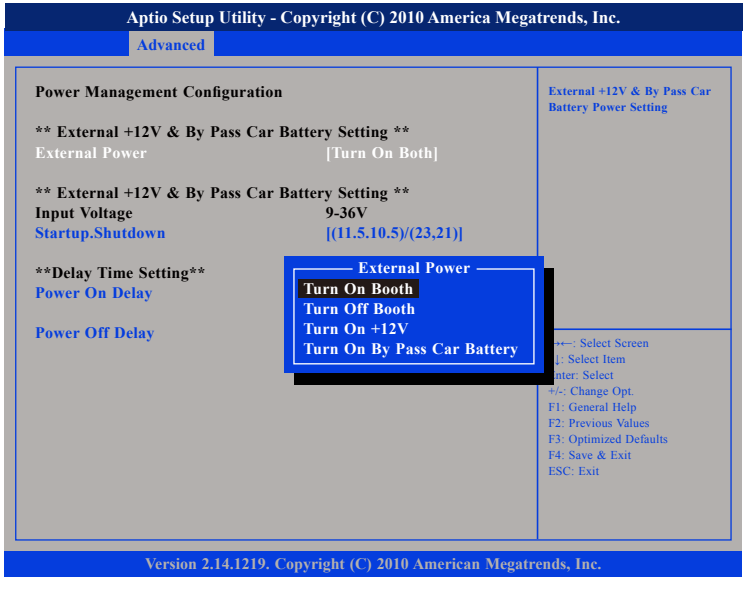
Appendix E: Vehicle Power Management Setup

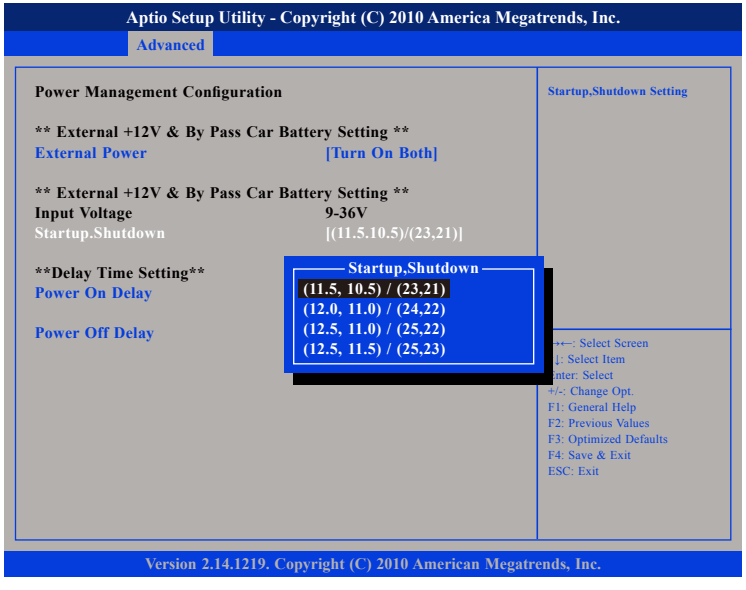
External Power Output Setting

VTC 7110 has four modes for external power output setting.
1. External +12V and By Pass Car Battery Turn On Simultaneously
2. External +12V and By Pass Car Battery Turn Off Simultaneously
3. External +12V Turn On Only
4. By Pass Car Battery Turn On Only


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay
Power Off Delay
External +12V & By Pass Car Battery Power Setting
External Power
Turn On Booth
Turn Off Booth
Turn On +12V
Turn On By Pass Car Battery
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.14.1219. Copyright (C) 2010 American Megatrends, Inc.

Startup and Shutdown Voltage Setting

Set the startup voltage to 11.5V or 23V and the shutdown voltage to 10.5V or 21V
If the input voltage is 12V: the startup voltage to 11.5V and the shutdown voltage to 10.5V.
If the input voltage is 24V: the startup voltage to 23V and the shutdown voltage to 21V.


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay
Power Off Delay
Startup,Shutdown Setting
Startup,Shutdown
(11.5, 10.5) / (23,21)
(12.0, 11.0) / (24,22)
(12.5, 11.0) / (25,22)
(12.5, 11.5) / (25,23)
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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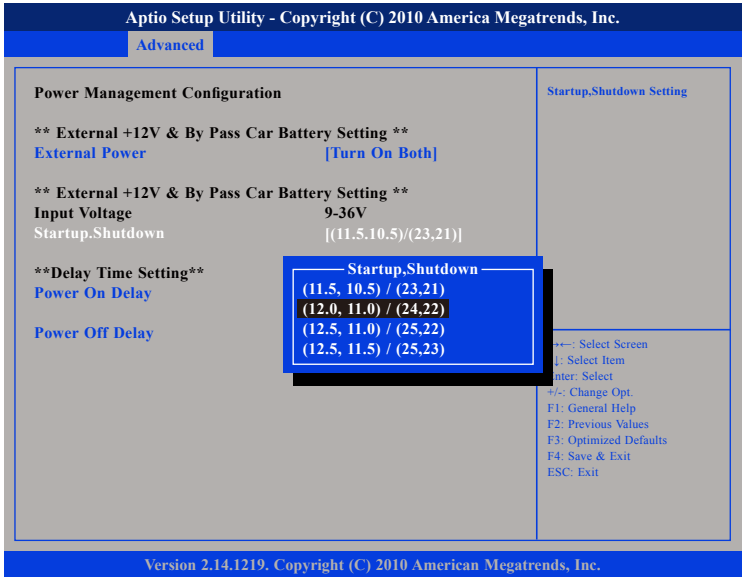
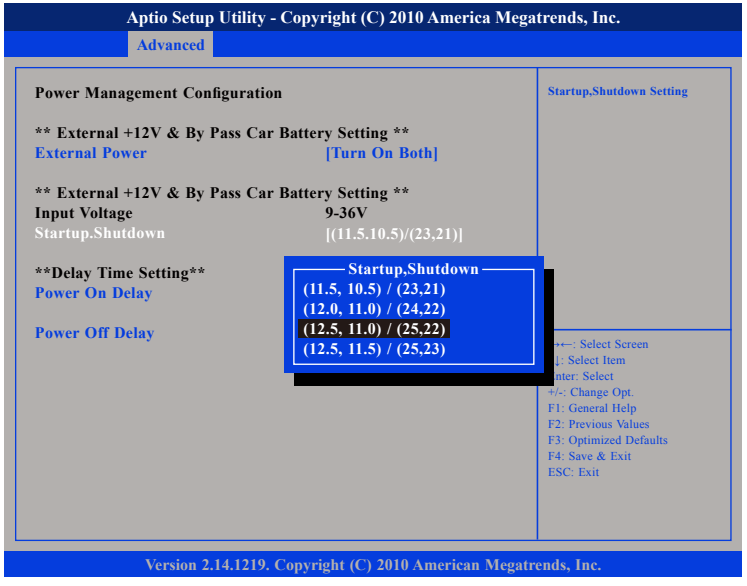
Set the startup voltage to 12.0V or 24V and the shutdown voltage to 11.0V or 22V

If the input voltage is 12V: the startup voltage to 12V and the shutdown voltage to 11V.
If the input voltage is 24V: the startup voltage to 24V and the shutdown voltage to 22V.



Set the startup voltage to 12.5V or 25V and the shutdown voltage to 11.0V or 22V

If the input voltage is 12V: the startup voltage to 12.5V and the shutdown voltage to 11V.
If the input voltage is 24V: the startup voltage to 25V and the shutdown voltage to 22V.



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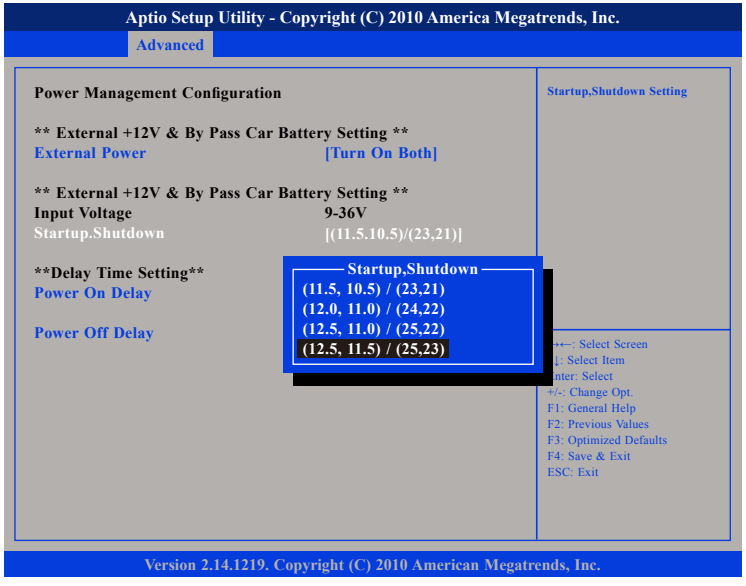
Set the startup voltage to 12.5V or 25V and the shutdown voltage to 11.0V or 22V

If the input voltage is 12V: the startup voltage to 12.5V and the shutdown voltage to 11.5V.
If the input voltage is 24V: the startup voltage to 25V and the shutdown voltage to 23V.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Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay
Power Off Delay
Startup,Shutdown Setting
Startup,Shutdown
(11.5, 10.5) / (23,21)
(12.0, 11.0) / (24,22)
(12.5, 11.0) / (25,22)
(12.5, 11.5) / (25,23)
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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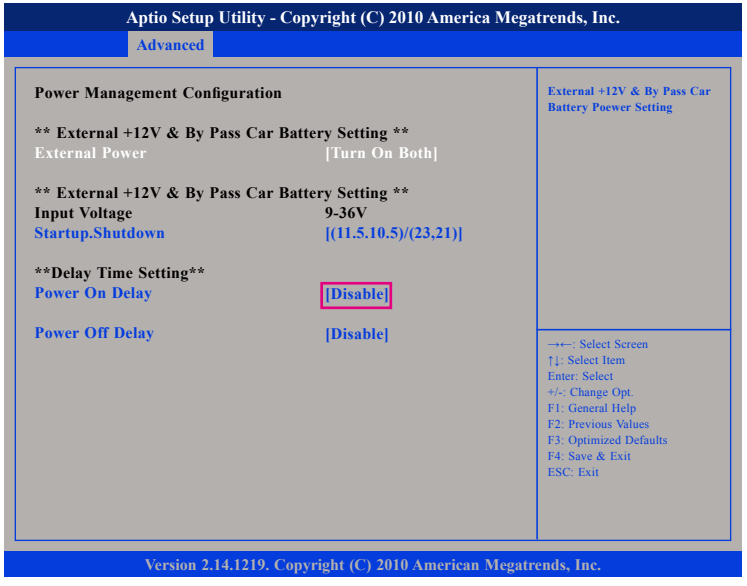
Power-on Delay Setting

Disable Power-on Delay


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay [Disable]
Power Off Delay [Disable]
External +12V & By Pass Car Battery Poewer Setting
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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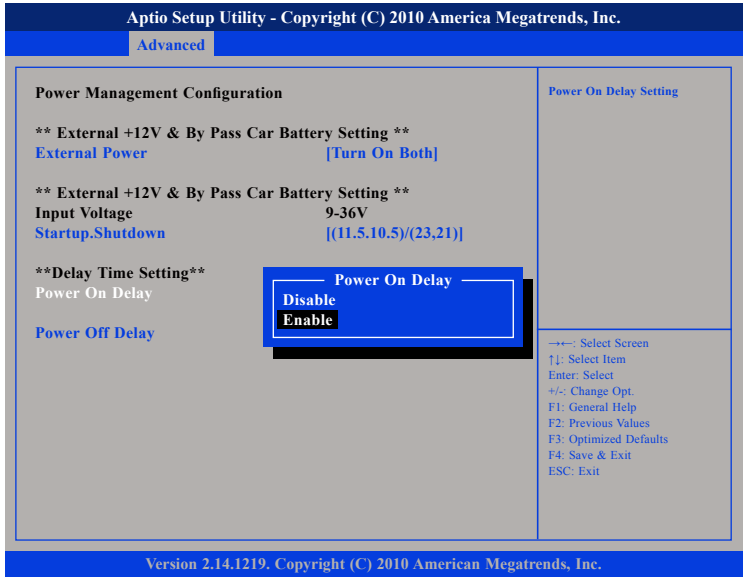
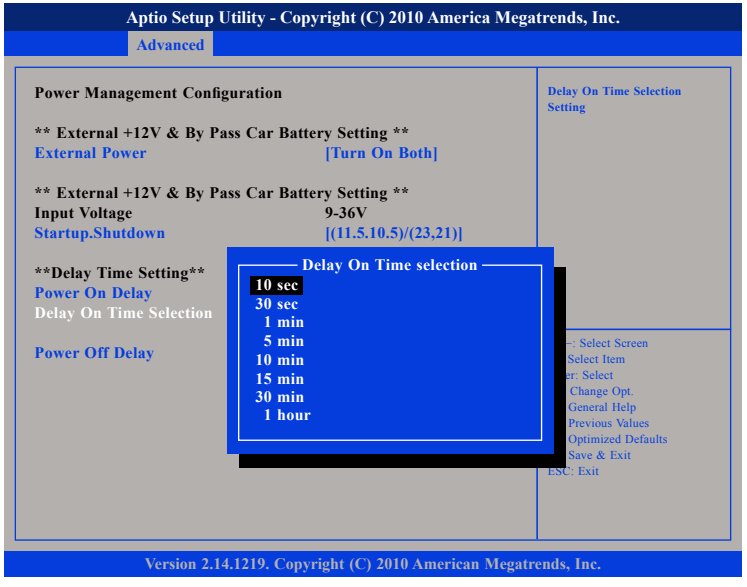
Enable Power-on Delay

Delay time can be set at 10sec/30sec/1min./5min./10min./15min./30min./1hour.





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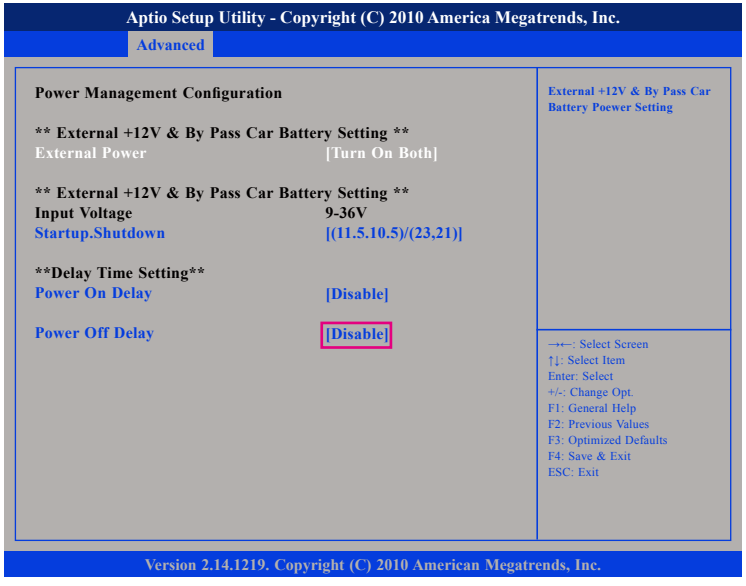
Power-off Delay Setting

Disable Power-off Delay


Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power [Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage 9-36V
Startup.Shutdown [(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay [Disable]
Power Off Delay [Disable]
External +12V & By Pass Car Battery Poewer Setting
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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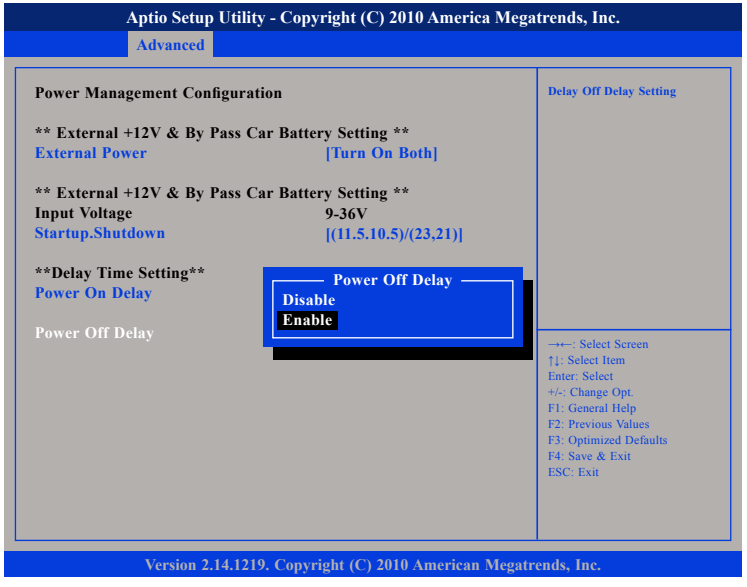
Enable Power-off Delay

Delay time can be set at 20sec/1min./5min./10min./30min./1hour/6hour/18hour.



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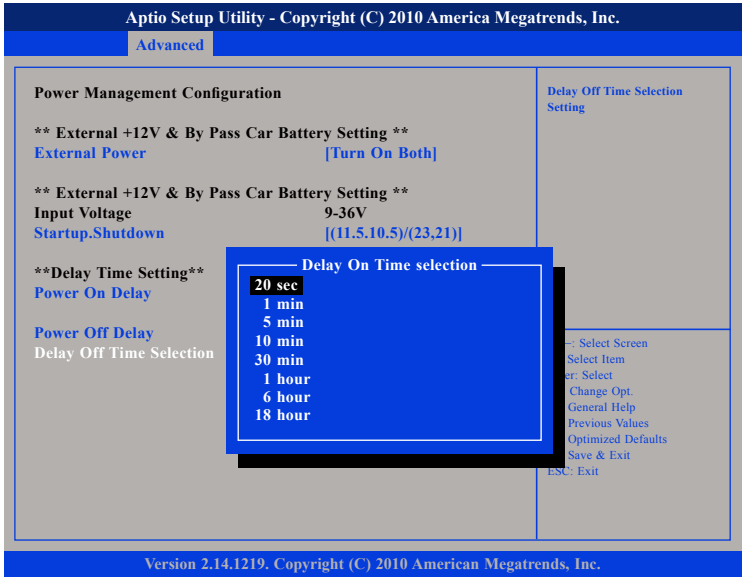
Aptio Setup Utility - Copyright (C) 2010 America Megatrends, Inc.
Advanced
Power Management Configuration
** External +12V & By Pass Car Battery Setting **
External Power
[Turn On Both]
** External +12V & By Pass Car Battery Setting **
Input Voltage
9-36V
Startup.Shutdown
[(11.5.10.5)/(23,21)]
Delay Time Setting
Power On Delay
Power Off Delay
Delay Off Time Selection
Delay On Time selection
20 sec
1 min
5 min
10 min
30 min
1 hour
6 hour
18 hour
Delay Off Time Selection
Setting
Select Item
Change Opt.
General Help
Previous Values
Optimized Defaults
Save & Exit
ESC: Exit
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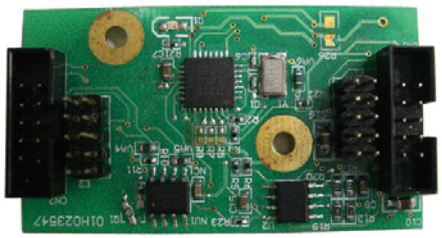
Appendix F: OBDII Module Setup and Command

OBDII Module



VTC series offer an option to integrate the OBDII module, VIOX-CAN01, into VTC system. The form factor of this VIOX-CAN01 is proprietary and it can support either SAE J1939 or SAE J1708 via connection in the first time. The maximum VIOX-CAN01 installed in VTC series is up to three units. Please note they are factory option.

VIOX-CAN01 Setup

When you start connecting VTC device to CAN bus device, you need a terminal program to send and receive data. To use the terminal program, please follow the setting below.
(1) Set the proper corresponding "COM" port and its data rate is 9600
(2) Set data bits at 9, stop bit at 1 and no parity bits.

After the setting, you will see the prompt with ">" character. This indicates that the device is in the idle state and ready to receive characters on the COM port.

If you do not see prompt string, please reset the device with ATR (reset) command and then press the return key:
>ATR or >AT R (spaces are optional; and case is in-sensetive).

You can also type HEX code instead:
"41", "54", "5A", "0D"

If you see the strange characters instead of ">", you may set the incorrect baud rate. Please check baud rate. If you send the incorrect command, the device will show a single question mark ("?") to indicate your input is not understood. If VTC fails to link to the BUS, it will show "PLEASE REBOOT".

Once VTC connect to BUS, it will start to try which protocol is connected either J1939 or J1708. Once it is determined, it will only accept the successful protocol next time unless using ATR command to reset it. This means you can change the protocol by reset command. After the reset command, please power off the device and turn on it again.

In case, the device cannot find correct protocol after 180 seconds, it will enter sleeping mode for power saving.

There are several output format available for the different application including:
(1) Simple Data by ASCII Code
(2) Raw Data
(3) Packaged Messages by ASCII or HEX code.

The default setting is Simple Data Format. The device will send messages out after it communicates with vehicle successfully. The output format can be changed via setting the AT command. Please refer the following section of AT command.

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AT Command Summary

@1	AT@1: Display version information
BRxy	Setting RS232 baud rate. xy is baud rate parameter. ATBR09: 9600 ATBR19: 19200 ATBR38: 38400 ATBR57: 57600 ATBR99: 115200
Eh	ATE0: echo off(Default) ATE1; echo on
T	ATT: Terminate sending. To use ATS will continue it.
I	ATI : Request vehicle ID, the length is variable. 1.) J1708: Output format: ASCII code Byte 0:0x2A Byte 1: Vehicle ID byte 1 Byte 2: Vehicle ID byte 2 Byte N:Vehicle ID byte N Byte N+1: Check Sum=Byte 1+Byte2+…….+Byte N Byte N+2:0x0D Byte N+3:0x0A N: Max 20 2.)J1939 Byte 0:0x2A Byte 1: Vehicle ID byte 1 Byte 2: Vehicle ID byte 2 Byte N:Vehicle ID byte N Byte N+1: Check Sun= Byte1+Byte2 +…..ByteN Byte N+1:0x0D Byte N+2:0x0A N: Max 35

PA	ATPA: Print data by ASCII CODE format
PH	ATPH: Print data by HEX CODE format
RJ	ATRJ: Request J1939 FMS High Resolution Total Vehicle Distance #33~#36
RH	ATRH: Request Hino Truck Total vehicle distance (#33~#36)
S	ATS: Continue auto-send data every 100~200ms. To use ATT will terminal it.
SS	ATSS: Auto- send Simple Data every 100~200 ms. Refer to Simple Data format Protocol
SP	ATSP: Auto-send Packaging Messages every 100~200 ms. Refer to Packaging Messages protocol.
SR	ATSR: Auto-send J1939/J1708 Raw Data, Refer to Raw Data Protocol.
X	ATX: Request to send data of alternate, data format as ATS/ATSP command. For J1939 protocol: Packing1→Packing2→Packing 3→Packing4→Packing5→ Packing6→Packing1 For J1708 protocol: Packing1→Packing2→Packing 3→Packing4→Packing5→ Packing1
#xy	AT#xy: The command will print designated data by ASCII code. “xy” is data address, it is decimal. J1708: 00~53 J1939: 00~99. EX: AT#01 , to get speed high byte.

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Simple Data Protocol: (ASCII CODE)

Data	Description
HEAD	@
Byte 0	,
Byte 1	Speed , (0~255) KM/HR
Byte 2	,
Byte 3	RPM High Byte (RPMHB)
Byte 4	,
Byte 5	RPM Low Byte(RPMLB) , RPM=RPMHB*256+RPMLB
Byte 6	,
Byte 7	Engine Loading, (0~100%)
Byte 8	,
Byte 9	Battery Voltage (BV), = (BV+100)/10 (v)
Byte 10	,
Byte 11	Engine Temperature(ET), =ET-40°C
Byte 12	,
Byte 13	Throttle position 0~100 %
Byte 14	,
Byte 15	Status , Note 2
Byte 16	,
Byte 17	MAF (0~255), MAF RATE= MAF * 3;
Byte 18	,
Byte 19	Distance : D1
Byte 20	,
Byte 21	Distance: D2
Byte 22	,
Byte 23	FU, Average Fuel Economy (km/L) =Fu /10
Byte 24	,
Byte 25	Check sum (odd numbers)= Byte1+ Byte3+Byte5+ Byte7+Byte9+Byte11+ Byte13+ Byte15+Byte17+ Byte19+Byte21+Byte23
Byte 26	Carry return (0x0D)
Byte 27	Line feed (0x0A)

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Simple Data Protocol: (HEX CODE)

Data	Description
HEAD	@ (=0x40)
Byte 1	Speed , (0~255) KM/HR
Byte 2	RPM High Byte (RPMHB)
Byte 3	RPM Low Byte(RPMLB) , RPM=RPMHB*256+RPMLB
Byte 4	Engine Loading, (0~100%)
Byte 5	Battery Voltage (BV), = (BV+100)/10 (v)
Byte 6	Engine Temperature(ET), =ET-40°C
Byte 7	Engine Loading, (0~100%)
Byte 8	Status , Note 2
Byte 9	MAF (0~255), MAF RATE= MAF * 3;
Byte 10	Distance: D1
Byte 11	Distance: D2
Byte 12	FU, Average Fuel Economy (km/L) =Fu /10
Byte 13	TCheck sum (odd numbers)= Byte1+ Byte2+Byte3+ Byte4+ Byte5+Byte6+ Byte7+ Byte8+Byte9+ Byte10+ Byte11+Byte12
Byte 14	Carry return (0x0D)
Byte 15	Line feed (0x0A)

NOTE:
1.) Data format : ASCII CODE
@ , 7 8 , 0 E , 7 0 , 0 0 ,0 3 , 9 8 , 2 8 , Status ,MAF,D1,D2,Fu,CS
speed=78 km/hr
rpm=0x0E70= 3696
2.) status:
Bit 7:
0: Normal
1: Emergency Braking (Acceleration < - 6 m/s2)
Bit 6:
0: Brake OFF
1: Brake ON
Bit 5:
0: Clutch OFF
1: clutch ON
Bit 4:
0: Cruise Control OFF
1: Cruise Control ON
Bit 3:
0: Brake (ON/OFF) unavailable
1: Brake(ON/OFF) available
Bit 2:
0:Clutch (ON/OFF) unavailable
1: Clutch (ON/OFF) available
Bit 1:
0: Cruise Control (ON/OFF) unavailable
1: Cruise Control (ON/OFF) available
Bit 0:
0: NORMAL
1: DTC ON
2.) Distance = D1*256+D2
3.) Average Fuel Economy =Fu /10

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J1939 Raw Data Protocol (HEX CODE)

Support for J1939 PGN / SPN access as defined in the J1939 standards. This function will report all PGNs and their source node on the J1939 network.

Each SPN under this function should be set to a size of 32 bits.

J1939	Format	
Byte 0	@ (=0x40)	
Byte 1	Bit4,3,2: Priority Bit0: Data Page Bit1,5,6,7:Reversed	
Byte 2	PDU Format (PF)	PGN
Byte 3	PDU Specific (PS)	
Byte 4	Source Address	
Byte 5	Data1	
Byte 6	Data2	
Byte 7	Data3	
Byte 8	Data4	
Byte 9	Data5	
Byte 10	Data6	
Byte 11	Data7	
Byte 12	Data8	
Byte 13	Check Sum	
Byte 14	0x0D	
Byte 15	0x0A	

J1708 Raw Data Protocol (HEX CODE)

This function will report all MID and PID that broadcasting on the J1708 network. Its data length is not fixed, please refer to SAEJ1708.

J1939	Format	PIDs 128-191	PIDs 0-127
Byte 0	@ (= 0x40)	@ (= 0x40)	@ (= 0x40)
Byte 1	Message identification (MID)	MID	MID
Byte 2	Parameter identification (PID)	PID	PID
Byte 3	Number of data bytes	Data1	Data1
Byte 4	Data 1	Data2	Check Sum
Byte 5	Data 2	Check Sum	0x0D
Byte 6	……..	0x0D	0x0A
Byte 7	Data N	0x0A	
Byte 8	Check Sum		
Byte 9	0x0D		
Byte 10	0x0A		

PIDs 0-127 describe data parameters that are one byte long.
PIDs 128-191 describe data parameters that consist of two bytes.
PIDs 192-253 The first byte following these PIDs will contain the number of data parameter bytes.

EX:
MID=128

0x40	0x80	0x15	0x01	0x32	0xC8	0x0D	0x0A
64	128	21	1	50	200	130	10

PID=21 (Engine ECU temperature)
Data=50

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J1939 Packaged Messages Protocol

S

ATS: send packaged messages by turns.

Response HEX CODE (default) after ATPH command

Packing 1: Byte 0:" @" ,(0x40) Byte 1: "1", (0x31) Byte 2: #00 Byte 3: #01 ..... Byte 19:#17 Byte 20: Check sum = Byte2 + ..+Byte 19 Byte 21: 0X0D Byte 22: 0X0A	Packing 2: Byte 0: " @" ,(0x40) Byte 1: "2",(0x32) Byte 2: #18 Byte 3: #19 ..... Byte 19:#35 Byte 20: Check sum = Byte2 + ..+Byte 19 Byte 21: 0X0D Byte 22: 0X0A	Packing 3: Byte 0: " @" ,(0x40) Byte 1: "3",(0x33) Byte 2: #36 Byte 3: #37 ..... Byte 19:#53 Byte 20: Check sum = Byte2 + ..+Byte 19 Byte 21: 0X0D Byte 22: 0X0A
Packing 4: Byte 0:" @" ,(0x40) Byte 1: "a",(0x41) Byte 2: #54 Byte 3: #55 ..... Byte 19:#71 Byte 20: Check sum = Byte2 + ..+Byte 19 Byte 21: 0X0D Byte 22: 0X0A	Packing 5: Byte 0: " @" ,(0x40) Byte 1: "b",(0x42) Byte 2: #72 Byte 3: #73 ..... Byte 19:#89 Byte 20: Check sum = Byte2 + ..+Byte 19 Byte 21: 0X0D Byte 22: 0X0A	Packing 6: Byte 0: " @" ,(0x40) Byte 1: "c",(0x43) Byte 2: #90 Byte 3: #91 ..... Byte 14:#102 Byte 19:0 Byte 20: Check sum = Byte2 + ..+Byte 19 Byte 21: 0X0D Byte 22: 0X0A

NOTE :
1. AT#00 ~ AT#102 respond ASCII CODE format data.
2. Packing 6, Byte15~Byte19 not defined (set to "0")
3. After ATPA command, byte 21& 22 were ignored.
4. This is the common J1939 measurement overview showing which measurements are available. Note that not all measurements are supported by the individual engines.

#00	Speed Low Byte (SLB)
#01	Speed High Byte (SHB) speed=(SHB*256+SLB)/256
#02	B7 B6 B5 B4 B3 B2 B1 B0 Clutch switch / Brake switch / NOT USED / Cruise control active 00 = pedal released, 01 = pedal depressed / 00 = pedal released, 01 = pedal depressed / 00 = switched off, 01 = switched on
#03	B7 B6 B5 B4 B3 B2 B1 B0 B7: Emergency brake(-6m/s2) B6: speed up (6m/s2) B5: Double Emergency brake (over -12m/s2) 1: Enable, 0:Disable PTO state 00000 = off/disabled 00101 = Set 11111 = not available
#04	0.4 % / Bit gain, Accelerator Pedal Position(APP) , 0 to 100 % APP= Data* 0.4
#05	Engine Total Fuel used 0,5 L / Bit gain , ETF1
#06	Engine Total Fuel used 0,5 L / Bit gain , ETF2
#07	Engine Total Fuel used 0,5 L / Bit gain , ETF3
#08	Engine Total Fuel used 0,5 L / Bit gain , ETF4 Engine Total Fuel used =((ETF4*256*256*256)+(ETF3*256*256)+(ETF2*256)+ETF1)*0.5
#09	Fuel Level (FL) , 0 to 100 %, 0.4 %/bit Fuel Level=FL*0.4
#10	RPM Low byte, RL
#11	RPM High byte, RH RPM= (RH*256+ RL)* 0.125

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<table>
<tr><td>#12</td><td>
<table>
<tr><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td></tr>
<tr><td></td><td colspan="3">NOT USED</td><td colspan="4">Engine Starter Mode</td></tr>
</table>
B7: 1, Total Vehicle Distance is provided by vehicle ECU
0, Total Vehicle Distance is calculation value
B3~B0:
0000 start not requested
0001 starter active, gear not engaged
0010 starter active, gear engaged
0011 start finished; starter not active after having been actively engaged ?
(after 50ms mode goes to 0000)?
0100 starter inhibited due to engine already running
0101 starter inhibited due to engine not ready for start (preheating)
0110 starter inhibited due to driveline engaged
0111 starter inhibited due to active immobilizer
1000 starter inhibited due to starter over-temp
1001-1011 Reserved
1100 starter inhibited - reason unknown
1101 error
1111 not available
</td></tr>
<tr><td>#13</td><td>
Axle location The value 0xFF indicates not available.
<table>
<tr><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td></tr>
<tr><td colspan="4">Axle location Bit-mapped position number counting front to back facing forward
F = not available
position number, counting front to back on the vehicle. B7,B6,B5,B4
Axle location Bit-mapped position number counting front to back facing forward.</td><td colspan="4">Tire location Bit-mapped counting left to right facing forward
F = not available
The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel</td></tr>
</table>
</td></tr>
</table>

#14	Axle weight 0.5 kg / Bit gain (Low Byte),AWL
#15	Axle weight 0.5 kg / Bit gain (High Byte), AWH Weight=(AWH*256+AWL)*0.5
#16	Engine total hours of Operation, EH1
#17	Engine total hours of Operation, EH2
#18	Engine total hours of Operation, EH3
#19	Engine total hours of Operation, EH4 Accumulated time=((EH4*256*256*256)+(EH3*256*256)+(EH2*256)+EH1)*0.05
#20 | #27	Vehicle identification number, aabbccddeeffgghh (If the Vehicle ID contains more than 8 Bytes then #20~#27 are “00”, please use ATI command to request.
#20	aa
#21	bb
#22	cc
#23	dd
#24	ee
#25	ff
#26	gg
#27	hh
#28	Engine Percent Load At Current Speed (0~125 %)
#29 | #32	SW-version supported for trucks, Version number in the format ab.cd where this byte represents ASCII code #29 : “a” , #30: ‘b’, #31:’c’ , #32:’d’
#33 | #36	High Resolution Total Vehicle Distance, 5 m/bit, 0 to 21,055,406 km =((D4*256*256*256)+(D3*256*256)+(D2*256)+D1)*0.005 (KM)
#33	D1
#34	D2

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<table>
<tr><td>#35</td><td>D3</td></tr>
<tr><td>#36</td><td>D4</td></tr>
<tr><td>#37
|
#38</td><td>The distance which can be traveled by the vehicle before the next service inspection is required
SERV=(V2*256+V1)*5-160635 (KM)</td></tr>
<tr><td>#37</td><td>V1</td></tr>
<tr><td>#38</td><td>V2</td></tr>
<tr><td>#39</td><td>
<table>
<tr><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td></tr>
<tr><td colspan="2">Vehicle motion(B7,B6):
00 = Vehicle motion not detected
01 = vehicle motion detected</td><td colspan="3">Driv. 2 working stat state (B5,B4,B3)。G
000 = Rest
001 = Driver available
010 = Work
011 = Drive
110 = Error
111 = not available</td><td colspan="3">Driv. 1 working state (B2,B1,B0):
000 = Rest
001 = Driver available
010 = Work
011 = Drive
110 = Error
111 = not avaiable</td></tr>
</table>
</td></tr>
<tr><td>#40</td><td>
<table>
<tr><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td></tr>
<tr><td colspan="2">Vehicle Overspeed</td><td colspan="2">Driver 1 card</td><td colspan="4">Driver 1 time related state</td></tr>
</table>
Vehicle Over speed (B7,B6)。GIndicates whether the vehicle is exceeding the legal speed limit set in the tachograph.
00 = No over speed
01 = Over speed Driver 1 card (B5,B4)
00 = Card not present
01 = Card present
Driver 1 time related state (B3,B2,B1,B0)。GIndicates if the driver approaches or exceeds working time limits (or other limits).
0000 = normal
0001 = 15 min bef. 4.5 h
0010 = 4.5 h reached
0011 = 15 min bef. 9 h
0100 = 9 h reached
0101 = 15 min bef. 16 h
0110 = 16h reached
1110 = Error
1111 = not available
</td></tr>
</table>

<table>
<tr><td>#41</td><td>
<table>
<tr><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td></tr>
<tr><td colspan="2">NOT USED</td><td colspan="2">Driver 2 card (B5,B4)
00 = Card not present
01= Card present</td><td colspan="4">Driver 2 time related state (B3,B2,B1,B0)。
GIndicates if the driver approaches or exceeds working time limits (or other limits).
0000 = normal
0001 = 15 min bef. 4.5 h
0010 = 4.5 h reached
0011 = 15 min bef. 9 h
0100 = 9 h reached
0101 = 15 min bef. 16 h
0110 = 16h reached
1110 = Error
1111 = not available</td></tr>
</table>
</td></tr>
<tr><td>#42</td><td>
<table>
<tr><td>B7</td><td>B6</td><td>B5</td><td>B4</td><td>B3</td><td>B2</td><td>B1</td><td>B0</td></tr>
<tr><td colspan="2">Direction indicator</td><td colspan="2">Tachgraph performance</td><td colspan="2">Handling information</td><td colspan="2">System event</td></tr>
</table>
Direction indicator (B7,B6)。G
00 = Forward
01 = Reverse Tachgraph performance (B5,B4)
00 = Normal performance
01 = Performance analysis Handling information (B3,B2)
00 = no handling information
01 = handling information System event (B1,B0)
00 = no tachogr. Event
01 = tachogr. Event
</td></tr>
<tr><td>#43
|
#44</td><td>Tachogr. vehicle speed 1/256 km/h Bit gain
Speed= ((VS2*256)+VS1)/256</td></tr>
<tr><td>#43</td><td>VS1</td></tr>
<tr><td>#44</td><td>VS2</td></tr>
</table>

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#45	Engine Coolant Temperature(ECT) , -40 to 210 deg C ECT=data-40°C
#46	Engine Turbocharger Boost Pressure(ETBP), 2 kPa/bit , 0~500 KPA ETPB=data *2 (KPA)
#47	Engine Intake Manifold 1 Temperature(EIMT) , -40 to 210 deg C EIMT=data-40°C
#48	Bit7,6 Anti-Lock Braking (ABS) Active。G 00 - ABS passive but installed 01 - ABS active 10 – Reserved 11 - Not available Bit5~Bit0: Resvered.
#49	Brake Pedal Position (BPP), 0.4 %/bit, 0~100% BPP=data*0.4 (%)
#50	Parking and/or Trailer Air Pressure(PTAP), 8 kPa/bit PTAP=data *8 (KPA)
#51	Service Brake Air Pressure Circuit #1 (SBAPC1), 8 kPa/bit SBAPC1=data*8 (KPA)
#52	Service Brake Air Pressure Circuit #2 (SBAPC2), 8 kPa/bit SBAPC2=data*8 (KPA)
#53	Parking Brake Switch 00 = Parking brake not set 01 = Parking brake set
#54	Bit 1 ,Bit 0: Diagnostics supported 00 = diagnostics is not supported 01 = diagnostics is supported 10 = reserved 11 = don´t care Bit 3 ,Bit 2: Requests supported 00 = request is not supported 01= request is supported 10 = reserved 11 = don´t care Bit4~Bit7:Resvered

#55 | #56	Ambient Air Temperature: Temperature of air surrounding vehicle. AAT=(AATH* 256+AATL)*0.03125 -273 deg C #55: AATL #56: AATH
#57	Door Control 1: Bit 7,Bit6: Status 2 of doors 00 = all bus doors disabled 01 = at least 1 bus door enabled 10 = error 11 = not available Bit 5, Bit4: Ramp/Wheel chairlift 00 = inside bus 01 = outside bus 10 = Error 11 = not available Bit 3,2,1,0 : Position of doors 0000 = at least 1 door is open 0001 = closing last door 0010 = all doors closed 1110 = Error 1111 = not available
#58 | #56	Door Control 2, #58~#65 Lock Status: locked→doors cannot be operated by the driver or a passenger unlocked→door may be operated by the driver or a passenger Open Status: closed→door is completely closed open→door is not completely closed Enable Status: disabled→door cannot be opened by a passenger enabled→door can be opened by a passenger

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#58

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Lock Status Door 2 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit 5,Bit 4: Enable Status Door 1 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit 3,Bit 2: Open Status Door 1 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit 1,Bit 0: Lock Status Door 1 00 = Unlocked 01 = Locked 10 = Error 11 = Not available	

#59

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Open Status Door 3 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit 5, Bit 4: Lock Status Door 3 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit 3, Bit 2: Enable Status Door 2 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit 1, Bit 0: Open Status Door 2 00 = Closed 01 = Open 10 = Error 11 = Not available	

#60

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Enable Status Door 4 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit 5, Bit 4: Open Status Door 4 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit 3, Bit 2: Lock Status Door 4 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit 1, Bit 0: Enable Status Door 3 00 = Disabled 01 = Enabled 10 = Error 11 = Not available	

#61

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Lock Status Door 6 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit 5, Bit 4: Enable Status Door 5 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit 3, Bit 2: Open Status Door 5 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit 1, Bit 0: Lock Status Door 5 00 = Unlocked 01 = Locked 10 = Error 11 = Not available	

#62

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Open Status Door 7 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit 5, Bit 4: Lock Status Door 7 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit 3, Bit 2: Enable Status Door 6 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit1, Bit 0: Open Status Door 6 00 = Closed 01 = Open 10 = Error 11 = Not available	

#63

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Enable Status Door 8 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit 5, Bit 4: Open Status Door 8 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit 3, Bit 2: Lock Status Door 8 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit1, Bit 0: Enable Status Door 7 00 = Disabled 01 = Enabled 10 = Error 11 = Not available	

#64

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit 6: Lock Status Door 10 00 = Unlocked 01 = Locked 10 = Error 11 = Not available		Bit 5, Bit 4: Enable Status Door 9 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit 3, Bit 2: Open Status Door 9 00 = Closed 01 = Open 10 = Error 11 = Not available		Bit1, Bit 0: Lock Status Door 9 00 = Unlocked 01 = Locked 10 = Error 11 = Not available	

#65

B7	B6	B5	B4	B3	B2	B1	B0
Bit 3, Bit 2: Enable Status Door 10 00 = Disabled 01 = Enabled 10 = Error 11 = Not available		Bit1, Bit 0: Open Status Door 10 00 = Closed 01 = Open 10 = Error 11 = Not available					

#66 | #71

Time / Date:
#66 : Second=data * 0.25
#67 : Minutes=data
#68 : Hours=data
#69 : Month=data
#70 : Day=data * 0.25
#71 : Year=data-1985 (1985 to 2235 years)

#72

Alternator Status

B7	B6	B5	B4	B3	B2	B1	B0
Bit 7, Bit6: Alternator Status 4 00 = not charging 01 = charging 10 = error 11 = not available		Bit 5, Bit4: Alternator Status 3 00 = not charging 01 = charging 10 = error 11 = not available		Bit 3, Bit 2: Alternator Status 2 00 = not charging 01 = charging 10 = error 11 = not available		Bit 1, Bit 0: Alternator Status 1 00 = not charging 01 = charging 10 = error 11 = not available	

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#73	Selected Gear = data -125negative gear are reverse gears 00000000 = neutral 11111011 = park
#74	Current Gear=data-125 negative gear are reverse gears 00000000 = neutral 11111011 = park
#75 | #76	Bellow Pressure Front Axle Left Information of the pressure of the air suspension bellow at the left side of the front axle Pressure= ((BPFAL2*256)+BPFAL1)* 0.1 ,KPA
#75	BPFAL1
#76	BPFAL2
#77 | #78	Bellow Pressure Front Axle Right Information of the pressure of the air suspension bellow at the left side of the front axle Pressure= ((BPFAR2*256)+BPFAR1)* 0.1 ,KPA
#77	BPFAR1
#78	BPFAR2
#79 | #80	Bellow Pressure Rear Axle Left Information of the pressure of the air suspension bellow at the left side of the front axle Pressure= ((BPRAL2*256)+BPRAL1)* 0.1 ,KPA
#79	BPRAL1
#80	BPFAR2
#81 | #82	Bellow Pressure Rear Axle Right Information of the pressure of the air suspension bellow at the left side of the front axle Pressure= ((BPRAR2*256)+BPRAR1)* 0.1 ,KPA

#81	BPRAL1
#82	BPFAR2
#83 | #90	Driver's Identification (Driver 1 & Driver 2 identification) #83 | #84 | #85 | #86 | #87 | #88 | #89 | #90 The driver ID is only available if a digital tachograph is present
#91 | #92	Engine Fuel Rate (EFR). Amount of fuel consumed by engine per liter of hour. EFR=(EFR2*256+EFR1)* 0.05 , L/h Data Range: 0 to 3,212.75 L/h
#91	EFR1
#92	EFR2
#93 | #94	Engine Instantaneous Fuel Economy(EIFE). Current fuel economy at current vehicle velocity. EIFE=(EIFE2*256+EIFE1) / 512 , km/L Data Range: 0 to 125.5 km/L
#95 | #102	FMS Tell Tale Status #95 | #96 | #97 | #98 | #99 | #100 | #101 | #102 The Tell Tale Status information is derived from information displayed to the driver's dashboard.
#95	Bit 3,2,1,0: Telltale Block ID Bit 7,6,5,4: Telltale Status 1 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available

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#96	Bit 3,2,1,0: Telltale Status 2 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 3 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available
#97	Bit 3,2,1,0: Telltale Status 4 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 5 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available

#98	Bit 3,2,1,0: Telltale Status 6 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 7 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available
#99	Bit 3,2,1,0: Telltale Status 8 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 9 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available

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#100	Bit 3,2,1,0: Telltale Status 10 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 11 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available
#101	Bit 3,2,1,0: Telltale Status 12 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 13 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available

#102	Bit 3,2,1,0: Telltale Status 14 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available Bit 7,6,5,4: Telltale Status 15 1000 = off 1001 = Cond. Red 1010 = Cond. Yellow 1011 = Cond. Info 1100–1110 = Reserved 1111 = not available

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J1708 Packaged Messages Protocol

S

Once AT1708 SLEEP, it can wake it up.
Start to send data by 3 packing, response HEX CODE

Packing 1:	Packing 2:	Packing 3:
Byte 0: " @" , 0x40;	Byte 0: " @" , 0x40;	Byte 0: " @" , 0x40;
Byte 1: 4	Byte 1: 5	Byte 1: 6
Byte 2: #00	Byte 2: #18	Byte 2: #36
Byte 3: #01	Byte 3: #19	Byte 3: #37
Byte 4: #02	Byte 4: #20	Byte 4: #38
Byte 5: #03	Byte 5: #21	Byte 5: #39
Byte 6: #04	Byte 6: #22	Byte 6: #40
Byte 7: #05	Byte 7: #23	Byte 7: #41
Byte 8: #06	Byte 8: #24	Byte 8: #42
Byte 9: #07	Byte 9: #25	Byte 9: #43
Byte 10: #08	Byte 10: #26	Byte 10: #44
Byte 11: #09	Byte 11: #27	Byte 11: #45
Byte 12: #10	Byte 12: #28	Byte 12: #46
Byte 13: #11	Byte 13: #29	Byte 13: #47
Byte 14: #12	Byte 14: #30	Byte 14: #48
Byte 15: #13	Byte 15: #31	Byte 15: #49
Byte 16: #14	Byte 16: #32	Byte 16: #50
Byte 17: #15	Byte 17: #33	Byte 17: #51
Byte 18: #16	Byte 18: #34	Byte 18: #52
Byte 19: #17	Byte 19: #35	Byte 19: #53
Byte 20: Check sum = Byte2 + ..+Byte 19	Byte 20: Check sum = Byte2 + ..+Byte 19	Byte 20:Check sum = Byte2 + ..+Byte 19
Byte 21: 0X0D	Byte 21: 0X0D	Byte 21: 0X0D
Byte 22: 0X0A	Byte 22: 0X0A	Byte 22: 0X0A

Packing 4 & 5 will display only there is trouble code occurrence.

Packing 4:	Packing 5:	
Byte 0: " @"	Byte 0: " @"	
Byte 1: 7	Byte 1: 8	
Byte 2:a	Byte 2:a	
Byte 3:b	Byte 3:b	
Byte 4:c	Byte 4:c	
Byte 5:a	Byte 5:a	
Byte 6:b	Byte 6:b	
Byte 7:c	Byte 7:c	
Byte 8:a	Byte 8:a	
Byte 9:b	Byte 9:b	
Byte 10:c	Byte 10:c	
Byte 11:a	Byte 11:a	
Byte 12:b	Byte 12:b	
Byte 13:c	Byte 13:c	
Byte 14:a	Byte 14:a	
Byte 15:b	Byte 15:b	
Byte 16:c	Byte 16:c	
Byte 17: Check sum = Byte2 + ..+Byte 21	Byte 17: Check sum = Byte2 + ..+Byte 21	
Byte 18: 0X0D	Byte 18: 0X0D	
Byte 19: 0X0A	Byte 19: 0X0A	

a — MID
b — SID or PID of a standard diagnostic code.
C — Diagnostic code character.
Bits 4-1: Failure mode identifier (FMI)

NOTE : The #00~#52 command respond that data are ASCII code.

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#00 | #01	Road Speed—Indicated vehicle velocity Maximum Range: 0.0 to 205.2 km/h (0.0 to 127.5 mph) speed=(SHB*256+SLB)/256
#00	Speed Low Byte (SLB)
#01	Speed High Byte (SHB)
#02	Cruise Control Status—State of the vehicle velocity control system (active, not active), and system switch (on, off), for various system operating modes. Bit 8: cruise mode 1=active/0=not active Bit 7: clutch switch 1=on/0=off Bit 6: brake switch 1=on/0=off Bit 5: accel switch 1=on/0=off Bit 4: resume switch 1=on/0=off Bit 3: coast switch 1=on/0=off Bit 2: set switch 1=on/0=off Bit 1: cruise control switch 1=on/0=off
#03	Brake Stroke Status—Identifies the current state of the vehicle foundation brakes. Bit 8-5: Axle number 1 to 16 (represented as 0 to 15) Bit 4-2: Brake status/Stroke adjustment 000 = OK 001 = Out of adjustment 010 = Delay brake return 011 = Brake pads worn 100 = Delayed brake application 101 = Reserved 110 = Error 111 = Not available Bit 1: 1 = Left wheel, 0 = Right wheel

#04	Percent Accelerator Pedal Position(PAPP)—Ratio of actual accelerator pedal position to maximum pedal position. Maximum Range: 0.0 to 102.0% PAPP= Data* 0.4
#05 | #08	Total Fuel Used (Natural Gas)—Accumulated amount of fuel used during vehicle operation. Maximum Range: 0.0 to 2 147 483 648 kg (0.0 to 4 724 464 025 lb) TFU=((ETF4*256*256*256)+(ETF3*256*256)+(ETF2*256)+ETF1)*0.473
#05	Engine Total Fuel used 0473 L / Bit gain , ETF1
#06	Engine Total Fuel used 0,473 L / Bit gain , ETF2
#07	Engine Total Fuel used 0,473 L / Bit gain , ETF3
#08	Engine Total Fuel used 0,473 L / Bit gain , ETF4
#09	Fuel Level—Ratio of volume of fuel to the total volume of the primary fuel storage container. Maximum Range: 0.0 to 127.5% Fuel Level=FL * 0.5 %
#10 | #11	Engine Speed (RPM)—Rotational velocity of crankshaft. Maximum Range: 0.0 to 16383.75 rpm RPM= (RH*256+ RL)* 0.25
#10	RPM Low byte, RL
#11	RPM High byte, RH
#12	Engine Oil Pressure(EOP)—Gage pressure of oil in engine lubrication system as provided by oil pump. Maximum Range: 0.0 to 879.0 kPa (0.0 to 127.5 lbf/in2) EOP=data * 3.45 KPA
#13	Throttle Position(TP)—The position of the valve used to regulate the supply of a fluid, usually air or fuel/air mixture, to an engine. 0% represents no supply and 100% is full supply. Maximum Range: 0.0 to 102.0% TP= data * 0.4%

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#14	Cargo Weight—The force of gravity of freight carried. Maximum Range: 0.0 to 1 166 056.9 N (0.0 to 262 140.0 lbf) (Low Byte),AWL
#15	(High Byte), AWH Weight=(AWH*256+AWL)* 17.792 N
#16	Total Engine Hours(TEH)—Accumulated time of operation of engine. Maximum Range: 0.0 to 214 748 364.8 h TEH=(((EH4*256*256*256)+(EH3*256*256)+(EH2*256)+EH1)*0.05
#16	Engine total hours of Operation, EH1
#17	Engine total hours of Operation, EH2
#18	Engine total hours of Operation, EH3
#19	Engine total hours of Operation, EH4
#20 | #27 #85 | #96	Vehicle Identification Number—Vehicle Identification Number (VIN) as assigned by the vehicle manufacturer. Vehicle identification number, aabbccddeeffgghh "ATI" command can show max 20 character VIN
#20	aa
#21	bb
#22	cc
#23	dd
#24	ee
#25	ff
#26	gg
#27	hh

#28	PTO Engagement Control Status PTO output status: Bits 8-5: Reserved—all bits set to 1 Bits 4-3: PTO #2 engagement actuator status Bits 2-1: PTO #1 engagement actuator status NOTE—Each status will be described using the following nomenclature: 00 Off/Not active 01 On/Active 10 Error condition 11 Not available
#29 | #30	Average Fuel Economy AFE=((AFE2*256)+AFE1) *1.660 72 x 10-3 km/L
#29	AFE1
#30	AFE2
#31 | #32	Mass Air Flow—Mass air flow measured at the fresh air intake MAF=((MAF2*256)+MF1)* 0.125 kg/min
#31	MAF1
#32	MAF2
#33 | #36	Total Vehicle Distance(TVD)—Accumulated distance travelled by vehicle during its operation. Maximum Range: 0.0 to 691489743 km (0.0 to 429 496 729.5 mi) Bit Resolution: 0.161 km (0.1 mi) TVD=((D4*256*256*256)+(D3*256*256)+(D2*256)+D1)*0.161 (KM) If vehicle dose not provide TVD, AT1708 replace the information with the calculated distance, deviation is 0.5%, The first time connection AT1708 please command ATR to clear distance memory.

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#33	D1
#34	D2
#35	D3
#36	D4
#37 | #38	Fuel Rate (Instantaneous)—Amount of fuel consumed by engine per unit of time. Maximum Range: 0.0 to 1.076 65 L/s FR=(V2*256+V1) * 16.428 x 106 L/s
#37	V1
#38	V2
#39 | #40	Total Vehicle Hours(TVH)—Accumulated time of operation of vehicle. Maximum Range: 0.0 to 214 748 364.8 h TVH=((H4*256*256*256)+(H3*256*256)+(H2*256)+H1)*0.05 (H)
#39	H1
#40	H2
#41	H3
#42	H4
#43	Reserved
#44	Percent Engine Load(PEL)—Ratio of current output torque to maximum torque available at the current engine speed. Maximum Range: 0.0 to 127.5% PEL=data * 0.5%
#45	Engine Coolant Temperature(ECT) , Maximum Range: 0.0 to 255.0 °F ECT= data °F
#46	Boost Pressure (BP)—Gage pressure of air measured downstream on the compressor discharge side of the turbocharger. Maximum Range: 0.0 to 219.8 kPa (0.0 to 31.875 lbf/in2) PB=data * 0.862 (KPA)
#47	Intake Manifold Temperature (IMT)—Temperature of precombustion air found in intake manifold of engine air supply system. Maximum Range: 0.0 to 255.0 °F IMT=data °F
#48	ABS Control Status Bits 8-7: ABS off-road function switch Bits 6-5: ABS retarder control Bits 4-3: ABS brake control Bits 2-1: ABS warning lamp 00 Off/Not active 01 On/Active 10 Error condition 11 Not available
#49	Parking Brake Switch Status—Identifies the state (active/inactive) of the parking brake switch. Bit 8: 1=active/0=inactive Bits 7-1: Undefined
#50	Brake Application Pressure (BAP) Maximum Range: 0.0 to 1055 kPa (0.0 to 153.0 lbf/in2) BAP=data *4.14 kPa
#51	Brake Primary Pressure (BPP)—Gage pressure of air in the primary, or supply side, of the air brake system. Maximum Range: 0.0 to 1055 kPa (0.0 to 153.0 lbf/in2) BPP=data* 4.14 (KPA)
#52	Brake Secondary Pressure—Gage pressure of air in the secondary, or service side, of the air brake system. Maximum Range: 0.0 to 1055 kPa (0.0 to 153.0 lbf/in2) BPP=data* 4.14 (KPA)
#53	Road Speed Limit Status :State (active or not active) of the system used to limit maximum vehicle velocity. Bit 8: 1=active/0=not active Bits 7-1: Undefined

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J1708 Command Example

1.) >AT#h,

Response: “Data1” “Data2” “H0D” “H3E” by ASCII CODE.

EX1:

AT#1, to get vehicle speed, if speed is 255,

Display,

FF

>

(H46,H46, H0D,H3E).

2.) Trouble code :

40 37 80 8 CA 80 A AA 80 B AA 80 C AA 80 1 AA FC D A

Trouble code :

MID 128(H80)

PID 8(H8)

Diagnostic code character (CA), FMI= A , bit4~bit1

4.) ATI : request vehicle ID,

2A	31	47	31	4A	46	32	37	57	37	47	4A	31	37	38	32	32	37	0	0	0	27	0D	0A
	1	G	1	G	F	2	7	W	8	G	J	1	7	8	2	2	7				CS		

Country Manufactured	1	U.S.A.(1 or 4), Canada (2), Mexico (3), Japan (J), Korea (K), England (S), Germany (W), Italy (Z)
Manufacturer	G	
Vehicle Type	1	
Vehicle Features	JF27W	
Accuracy Check Digit	8	
Model Year	G	1988 (J), 1989 (K), 1990 (L), 1991 (M), 1992 (N), 1993 (P), 1994 (R), 1995 (S), 1996 (T), 199 7(V), 1998 (W), 1999 (X), 2000 (Y), 2001(1), 2002 (2), 2003 (3)…..
Production Plant	J	
Sequential Number	178227	The sequence of the vehicle for production as it rolled of the manufacturers assembly line.

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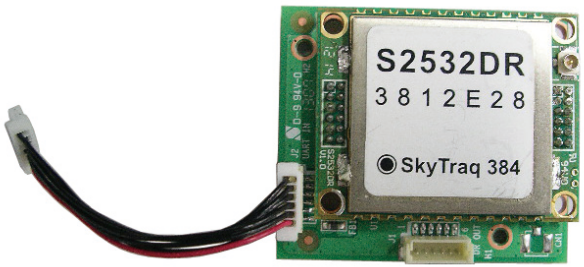
Appendix G: Pin Definition for GPS Dead Reckoning Module -- VIOB-GPS-DR01

S2532DR Overview



The S2532DR GPS Dead-Reckoning receiver module combines GPS position data, gyroscope data (measuring turning angle), and odometer data (measuring distance traveled) to formulate position solution. This enables accurate navigation solution in poor signal environment or signal blocked area such as inside tunnels. The S2532DR is ideal for applications requiring accurate continuous navigation with 100% availability.

The S2532DR features 65 channel GPS receiver with fast time to first fix and improved -148dBm cold start sensitivity. The superior cold start sensitivity allows it to acquire, track, and get position fix autonomously in difficult weak signal environment. The receiver's -161dBm tracking sensitivity allows continuous position coverage in nearly all application environments. The high performance search engine is capable of testing 8,000,000 time-frequency hypotheses per second, offering industry-leading signal acquisition and TTFF speed.

Technical Specifications

Receiver Type	L1 C/A code, 65-channel Venus 6 engine
Accuracy	Position 2.5m CEP Velocity 0.1m/sec Time 300ns
Startup Time	1 second hot start under open sky < 29 second warm start under open sky (average) 29 second cold start under open sky (average)
Reacquisition	1s
Sensitivity	-148dBm cold start -161dBm tracking
Update Rate	1Hz
Operational Limits	Altitude < 18,000m or velocity < 515m/s
Serial Interface	3.3V LVTTL level
Protocol	NMEA-0183 V3.01 PGGA, GPGLL, GPGSA, GPGSV, GPRMC, GPVTG*1 38400 baud, 8, N, 1
Datum	Default WGS-84 User definable
Input Voltage	3.3V DC +/-10%
Input Current	~40mA tracking
Dimension	25mm L x 32mm W
Weight	5g
Interface Connector	two 12-pin male header, 1.27mm pitch
Operating Temperature	-40oC ~ +85oC
Storage Temperature	-55 ~ +100oC
Humidity	5% ~ 95%

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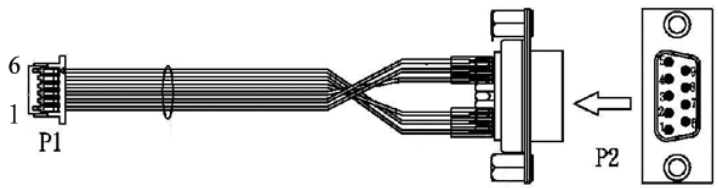
VIOB-GPS-DR01 consists of S2532DR and cables.
Here are the connector and cable pin definition for VIOB-GPS-DR01.

NOTE: If VIOB-GPS-DR01 is used, please remove onboard NEO-6Q GPS module first.

(1) Connect VIOB-GPS-DR01 and DB9 Cable (On VIOB-GPS-DR01)

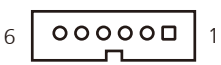
A. Connector type: 1x6 6-pin header
B. Connector location: J1

C. VIOB-GPS-DR01 to DB9 Cable (6P TO D-SUB-9M)



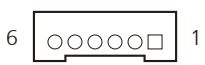
(2) Connect VIOB-GPS-DR01 and VTC 71 Carrier Board with Cable (On VIOB-GPS-DR01)

A. Connector type: 1x6 6-pin header
B. Connector location: J2



(On VTC 71 Carrier Board)

A. Connector type: 1x6 6-pin header
B. Connector location: J9



Connector pin definition of P1

Pin	Definition	Pin	Definition
1	GND	4	GPIO22
2	DIRECTION	5	1PPS
3	ODOMETER	6	GND

Connector pin definition of P2

Pin	Definition	Pin	Definition
1	1PPS	6	GND
2	GPIO22	7	NC
3	NC	8	NC
4	ODOMETER	9	GND
5	DIRECTION		

Connector pin definition of J9

Pin	Definition	Pin	Definition
1	+V3.3S	4	SP_TX1
2	GND	5	GPS_LED#
3	SP_RX1	6	GPS_BAT

NOTE: Onboard uBlox NEO-6Q GPS module can't be used with optional GPS dead reckoning module (VIOB-GPS-DR01) at the same time.

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